



DrJ Research Report

DRR 1205-05

Construction Details for the Use of
Foam Plastic Insulating Sheathing in
Light-Frame Construction

Foam Sheathing Committee (FSC) Members

**Code Compliance Process:
Construction detailing concepts
for application of foam plastic
insulating sheathing (FPIS)**

Issue Date:

July 9, 2012

Revision Date:

November 4, 2021



REPORT HOLDER
INFORMATION:

Foam Sheathing Committee (FSC) Members¹

americanchemistry.com/industry-groups/foam-sheathing-committee-fsc

continuousinsulation.org

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

SECTION: 07 21 00 - Thermal Insulation

SECTION: 07 25 00 - Water-Resistive Barriers/Weather Barriers

1 PRODUCT EVALUATED²

- 1.1 Construction detailing concepts for application of foam plastic insulating sheathing (FPIS)

2 APPLICABLE CODES AND STANDARDS^{3,4}

2.1 Codes

- 2.1.1 *IBC—15, 18, 21: International Building Code®*
- 2.1.2 *IRC—15, 18, 21: International Residential Code®*
- 2.1.3 *IECC—15, 18, 21: International Energy Conservation Code®*

2.2 Standards and Referenced Documents

- 2.2.1 *ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*
- 2.2.2 *ASTM C1289: Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board*
- 2.2.3 *SBCA ANSI/FS 100: Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies*

¹ The Foam Sheathing Committee (FSC) of the American Chemistry Council sponsors research and tools to support the reliable, efficient, and economic design and installation of foam sheathing. This report is developed by DrJ from a grant provided by FSC. Learn more about foam sheathing at continuousinsulation.org.

² For more information, visit drjengineering.org or call us at 608-310-6748.

³ Unless otherwise noted, all references in this DRR are from the 2021 version of the codes and the standards referenced therein. This material, design, or method of construction also complies with the 2000-2018 versions of the referenced codes and the standards referenced therein.

⁴ All terms defined in the applicable building codes are italicized.



3 EVALUATION SCOPE

- 3.1 This research report addresses the general construction framing details for applying FPIS continuous insulation in wood or steel light-frame exterior wall assemblies and mass walls (CMU or concrete), and integrating with various code-required wall components such as cladding, water-resistive barriers (WRB), vapor retarders, and air barriers.
 - 3.1.1 With a couple exceptions, details in this research report only illustrate solid wood structural framing members. However, the same principles apply for typical shapes used for cold-formed steel light-frame construction. The general concepts may also be used with CMU or concrete construction with slight modification.
- 3.2 Specific code compliance considerations are outside of the scope of this research report and must be verified by the user for a given selection and arrangement of materials or products for a given building location and climate condition, including but not limited to, continuous insulation amounts, wall cavity insulation amount and type, location and type of WRB, location and type of vapor retarder, location and type of air barrier, structural requirements, thermal resistance or fire endurance, and flame spread characteristics.
- 3.3 Consult the FPIS manufacturer and manufacturers of other wall components for material property data regarding vapor permeability, WRB qualification, air barrier qualification, fire performance properties, and other matters required to ensure an overall code-compliant wall assembly.
- 3.4 For guidance on specific matters of code compliance, refer to the locally applicable building code, manufacturer's installation instructions for specified materials, and the research reports listed in Section 7 that address specific code compliance topics for appropriate application of FPIS materials.
- 3.5 Any code compliance issues not specifically addressed in this section are outside the scope of this DRR.
- 3.6 Any engineering evaluation conducted for this DRR was performed within DrJ's professional scope of work on the dates provided herein.

4 PRODUCT DESCRIPTION AND MATERIALS

- 4.1 This research report applies to the following manufacturers and products:
 - 4.1.1 Atlas Roofing Corporation – EnergyShield®, EnergyShield® CGF, EnergyShield® CGF Pro, Stucco-Shield®, ThermalStar, ThermalStar LWi, ThermalStar GPS, ThermalStar T&G, and ThermalStar SWi
 - 4.1.2 BASF Corporation – Neopor®, Neopor® ThermaPlus™
 - 4.1.3 DuPont de Nemours, Inc. – Tuff-R™, Super Tuff-R™, Thermax™, Isocast™ R Thermal, and Styrofoam™
 - 4.1.4 Hunter Panels – Xci Foil (Class A), Xci CG (Class A), Xci 286, Xci Ply (Class A), Xci Foil, Xci CG, Xci Ply, and Xci NB
 - 4.1.5 Kingspan Insulation, LLC – GreenGuard® Insulation Boards: CM, SL, SLX, and PGU
 - 4.1.6 Rmax – R-Matte® Plus-3, Durasheath®, Thermasheath®, Thermasheath®-SI, Thermasheath®-XP, ECOMAXci® FR, ECOMAXci® FR White, ECOMAXci® Wall Solution, ECOMAXci® Ply, ECOMAXci® FR Ply, ThermaBase-CI™, TSX-8500, and TSX-8510
- 4.2 FPIS products used in accordance with this research report shall comply with the following material standards:
 - 4.2.1 Expanded polystyrene (EPS) manufactured in compliance with *ASTM C578*
 - 4.2.2 Extruded polystyrene (XPS) manufactured in compliance with *ASTM C578*
 - 4.2.3 Polyisocyanurate (Polyiso) manufactured in compliance with *ASTM C1289*
- 4.3 FPIS products are produced under proprietary manufacturing processes and are formed into rigid insulation panels.
- 4.4 Where wind pressure resistance is required, FPIS products used in accordance with this research report shall comply with *SBCA ANSI/FS 100*.
- 4.5 EPS and XPS foam plastic sheathing complying with *ASTM C578* are used with:
 - 4.5.1 No facings
 - 4.5.2 Facings on one side

- 4.5.3 Facings on both sides
- 4.6 Polyiso foam plastic sheathing complying with ASTM C1289 must have facings on both sides.
- 4.7 FPIS products are typically available in the following sizes:
 - 4.7.1 Thicknesses range from ½" to 6".
 - 4.7.2 The standard product width is 48".
 - 4.7.3 Standard lengths include 96", 108", and 120".
- 4.8 Consult manufacturer for availability of product in non-standard widths or lengths.
- 4.9 Consult FPIS manufacturer and manufacturers of other wall components for material property data regarding vapor permeability, WRB qualification, air barrier qualification, fire performance properties, and other matters required to ensure an overall code-compliant wall assembly. See Section 7 for additional information.



FIGURE 1. EXAMPLES OF POLYISO, XPS, AND EPS FOAM PLASTIC INSULATING SHEATHING

5 APPLICATIONS

5.1 General Requirements

- 5.1.1 All wall assembly components shall be approved, installed, and inspected in accordance with the applicable building code, approved construction documents, manufacturer installation instructions, and good practice.
- 5.1.2 FPIS products shall be attached to and supported by the wall framing in accordance with the manufacturer's installation instructions.

5.2 Terminology

- 5.2.1 Air Barrier – Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material or a combination of materials.
- 5.2.2 Continuous Insulation (CI) – Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.
- 5.2.3 Flashing – Materials used to aid in the integration of fenestration products and penetrations into a wall assembly to direct liquid water to the exterior side of the WRB. Flashing materials consist of many types based on application (e.g., head, jamb, cap, sill, etc.) and may be attached using various methods (e.g., mechanical, self-adhered, liquid or spray applied, etc.).
- 5.2.4 Vapor Retarder – Material placed within a wall assembly to control the flow of water vapor through the assembly.
- 5.2.5 Water-Resistive Barrier (WRB) – A material behind an exterior wall covering assembly or cladding that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the exterior wall assembly. Function may be provided by taped joints and penetrations of FPIS if tested by the manufacturer and installed per the manufacturer's installation instructions. A separate WRB membrane may also be placed to the inside or outside of the FPIS.

6 INSTALLATION

- 6.1 The details shown in this research report are conceptual in nature and are intended to provide the user with code compliance and best practices for detailing walls using FPIS. Suitability for a specific application is the responsibility of the building designer. See Section 9 for specific conditions of use.

Detail	Topic	Figures
Basic Wall Assembly Variations	Light Frame Wall	Figure 2. Wood-Frame Wall with Structural Panel (as required) Bracing and Exterior Finish of FPIS, WRB, and Lap Siding
		Figure 3. Wood-Frame Wall with Structural Panel (as required) Bracing and Exterior Finish of FPIS (joints taped) as WRB, Furring, and Lap Siding
		Figure 4. Wood-Frame Wall with Structural Panel Bracing (as required) and Exterior Finish of FPIS, WRB, Furring, and Lap Siding
		Figure 5. Wood-Frame Wall with Let-in Bracing (LIB) and Exterior Finish of WRB, FPIS, Furring, and Lap Siding
		Figure 6. Wood-Frame Wall with LIB and Exterior Finish of FPIS, WRB, Drainage Space, and PC Stucco
		Figure 7. Wood-Frame Wall with LIB and Exterior Finish of FPIS as WRB and Brick Veneer
		Figure 8. Wood-Frame Wall with LIB Bracing, FPIS as WRB, Furring (or Drainage Mat), Lath, and Stucco Veneer
		Figure 9. Inside Corner: Wood Frame Wall with Continuous Insulation, FPIS, WRB, and Lap Siding without Furring (Provide sufficient framing to attach siding trim & siding as well as interior finish)
		Figure 10. Inside Corner: Wood Frame Wall with Continuous Insulation, FPIS Taped (WRB), Furring, and Lap Siding (Provide sufficient framing to attach siding trim & siding as well as interior finish).
		Figure 11. Outside Corner: Wood Frame Wall with Continuous Insulation, FPIS Taped (WRB), Furring, and Lap Siding (Provide sufficient framing to attach siding trim & siding as well as interior finish).
	Bottom of Wall	Figure 12. Bottom of Wall Covered in FPIS with Flashing and Extending Down Foundation
		Figure 13. FPIS Extending Over Foundation with Protection Board Where Exposed Above Grade
		Figure 14. FPIS Extending Over Foundation with Termite Shield, Horizontal Mechanical Flashing, and Protection Board (or Coating) over FPIS Where Exposed Above Grade
		Figure 15. Concrete or CMU Wall, (1-1/2" or less) FPIS, 2 layers WRBs, Stucco [Alternate WRB options: (1) one separate WRB behind FPIS (2) FPIS taped joints + 1 layer WRB (building paper)]
		Figure 16. Concrete or CMU Wall, (1-1/2" or greater) FPIS (taped as WRB), Wood Furring, Stucco [Alternate WRB options: (1) one separate WRB behind FPIS (2) on separate WRB in front of FPIS]
	Top of Wall – Gable with Unconditioned Attic Space	Figure 17. Top of Wall at Gable End with Gable End Frame Sheathed with WSP & Supported Over FPIS with 2x, Which Also Extends to Inside of Wall to Supply Attachment for Ceiling Finish (Note: Bracing is not shown)
		Figure 18. Top of Wall at Gable End with Gable End Frame Sheathed with WSP & Cantilevered Over Wall (Note: Gable bracing is not shown. Contact component manufacturer for load-specific details)
	Top of Wall – Gable with Conditioned Attic Space	Figure 19. Top of Wall at Gable End with Gable End Frame Sheathed with FPIS Continuous from Wall Below (Note: Bracing is not shown.)
	Top of Wall – Eave	Figure 20. Top of Wall at Eave with Rafter Construction
		Figure 21. Top of Wall at Eave with Standard Heel Truss



Detail	Topic	Figures
		Figure 22. Top of Wall at Eave with Cantilever Truss
		Figure 23. Top of Wall at Energy Heel Truss
		Figure 24. Top of Wall Standard Truss Eave Detail with Eave Ledger Attached to Structural Framing Through FPIS
	Roof Intersection with Wall	Figure 25. Roof Intersecting with Wall
		Figure 26. Roof Intersecting with Wall (view from inside showing blocking)
	Deck Ledger	Figure 27. Deck Ledger – 2" FPIS Wall Sheathing, 1" FPIS Behind Ledger at Patio Door Opening
		Figure 28. Deck Ledger – 2" FPIS Wall Sheathing, 1" FPIS behind Ledger at Rim
Window/Door Penetration Details	Standard Installation	Figure 29. Standard Installation – Sill
		Figure 30. Standard Installation – Jamb
		Figure 31. Standard Installation – Header
	Lumber Window Buck Installation	Figure 32. Wood Buck Installation – Sill
		Figure 33. Wood Buck Installation – Jamb
		Figure 34. Wood Buck Installation – Header
	Picture Frame Installation	Figure 35. Picture Frame Installation – Sill
		Figure 36. Picture Frame Installation – Jamb
		Figure 37. Picture Frame Installation – Header
	Rainscreen Installation	Figure 38. Rainscreen Installation – Sill
		Figure 39. Rainscreen Installation – Jamb
		Figure 40. Rainscreen Installation – Header
	Other Penetrations	Figure 41. Penetration – 2" FPIS Taped Joints, Furring, Lap Siding

6.2 Basic Wall Assembly Variations

6.2.1 Light Frame Wall

- 6.2.1.1 Wall assemblies showing structural framing (e.g., wood or cold-formed steel), interior finish, vapor retarder, cavity insulation, wall bracing (e.g., structural sheathing or wood let-in brace or metal strap brace), FPIS (continuous insulation), WRB, and exterior finish (siding and trim).

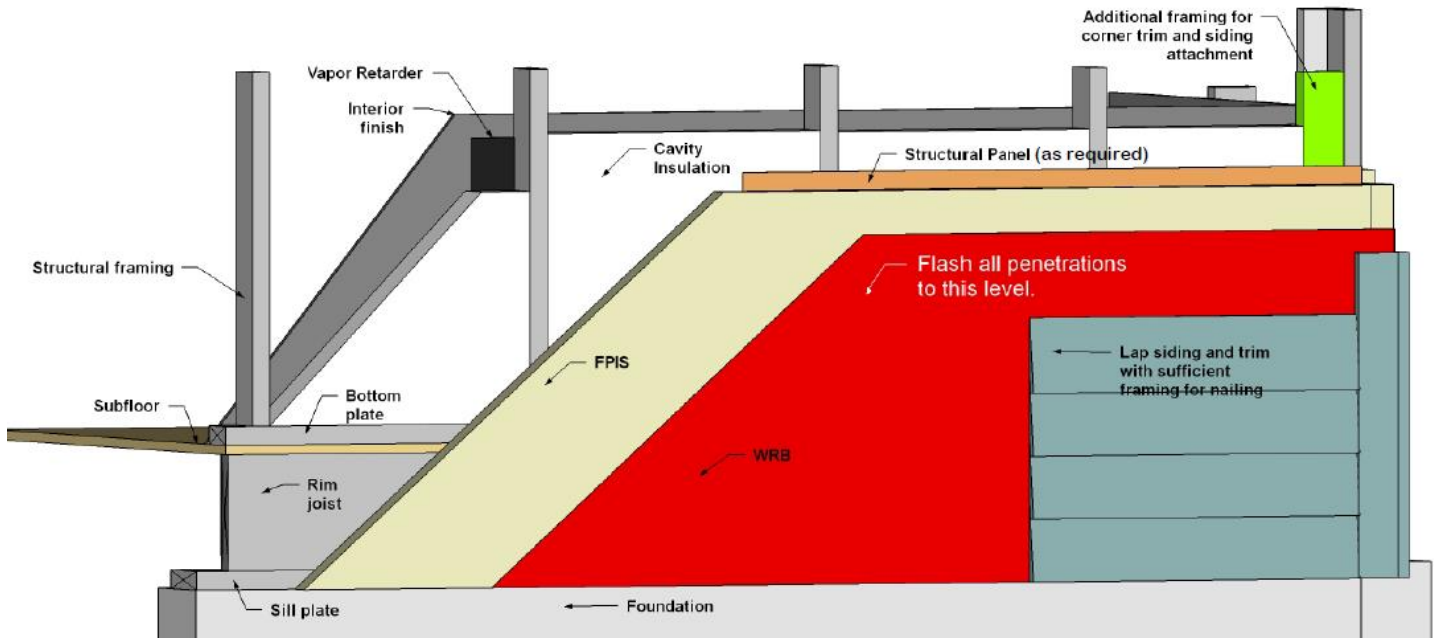


FIGURE 2. WOOD-FRAME WALL WITH STRUCTURAL PANEL (AS REQUIRED) BRACING AND EXTERIOR FINISH OF FPIS, WRB, AND LAP SIDING

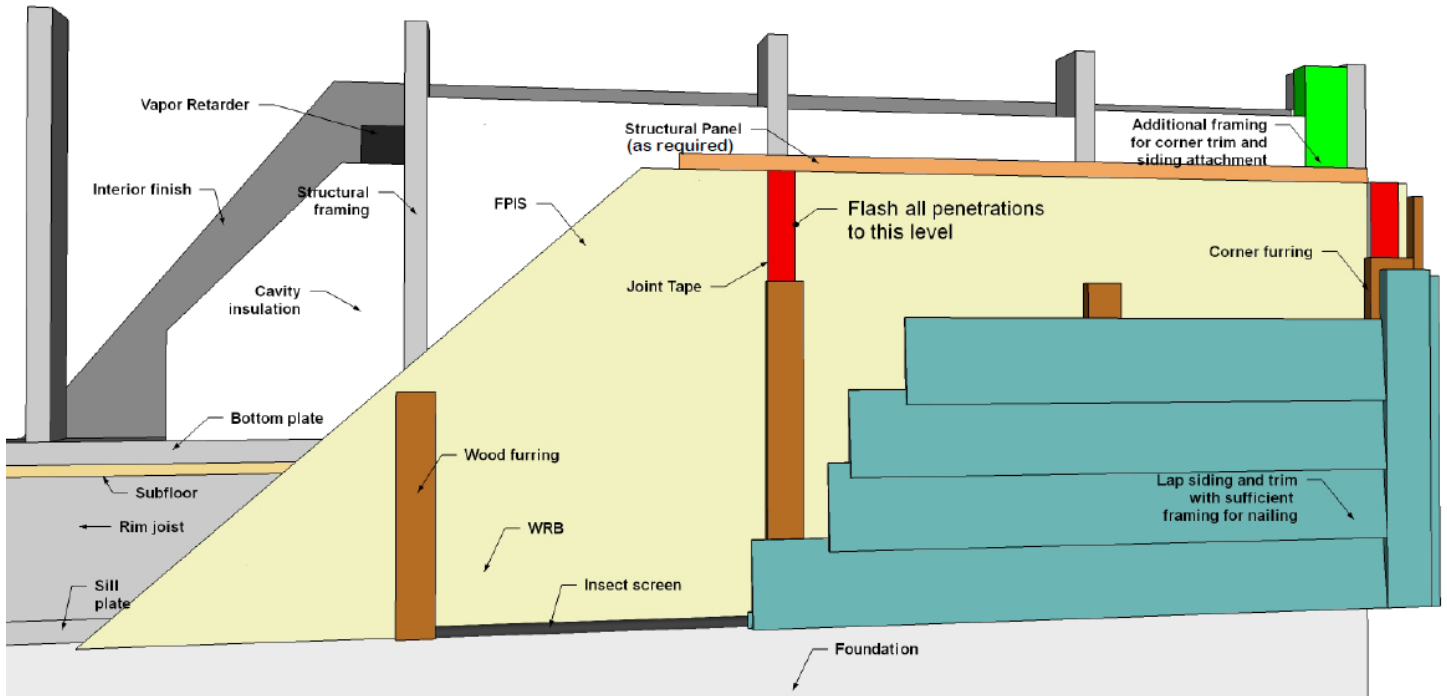


FIGURE 3. WOOD-FRAME WALL WITH STRUCTURAL PANEL (AS REQUIRED) BRACING AND EXTERIOR FINISH OF FPIS (JOINTS TAPED) AS WRB, FURRING, AND LAP SIDING⁵

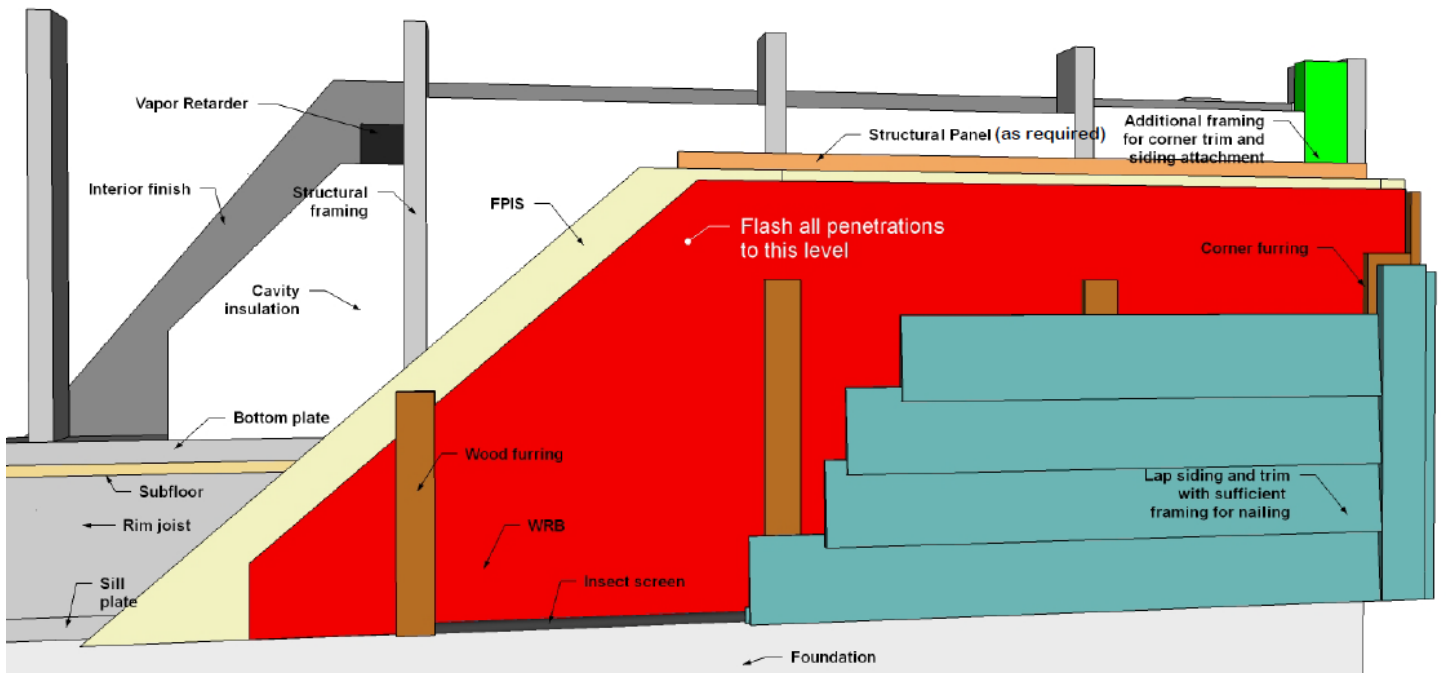


FIGURE 4. WOOD-FRAME WALL WITH STRUCTURAL PANEL BRACING (AS REQUIRED) AND EXTERIOR FINISH OF FPIS, WRB, FURRING, AND LAP SIDING

⁵ Furring as shown in Figure 3 is optional unless specifically required for the cladding installation (e.g., horizontal furring for wood shake and shingle installation). Furring is recommended for applications where additional drainage and ventilation of cladding is preferable and where FPIS thickness exceeds approximately 2".

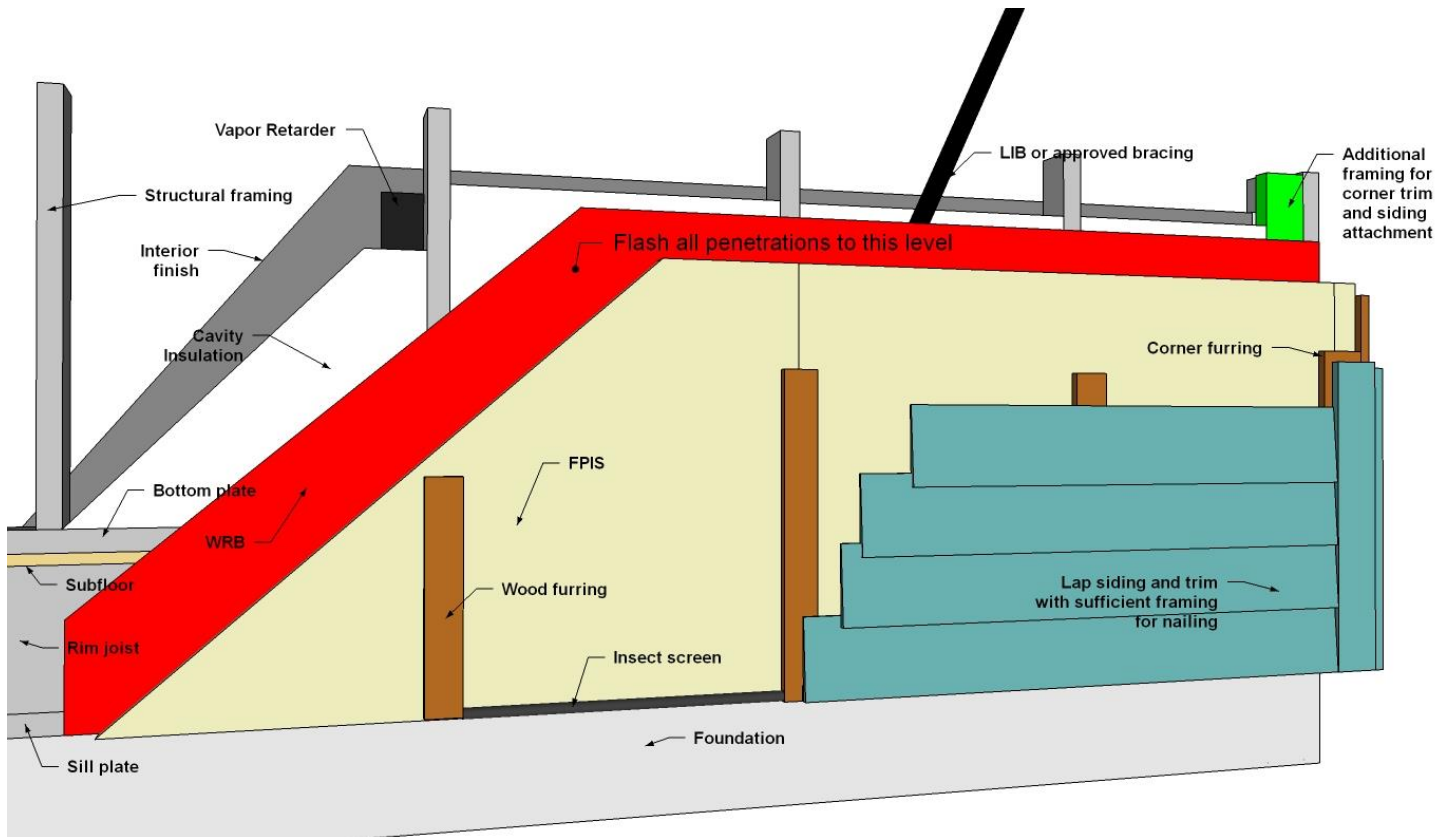


FIGURE 5. WOOD-FRAME WALL WITH LET-IN BRACING (LIB) AND EXTERIOR FINISH OF WRB, FPIS, FURRING, AND LAP SIDING

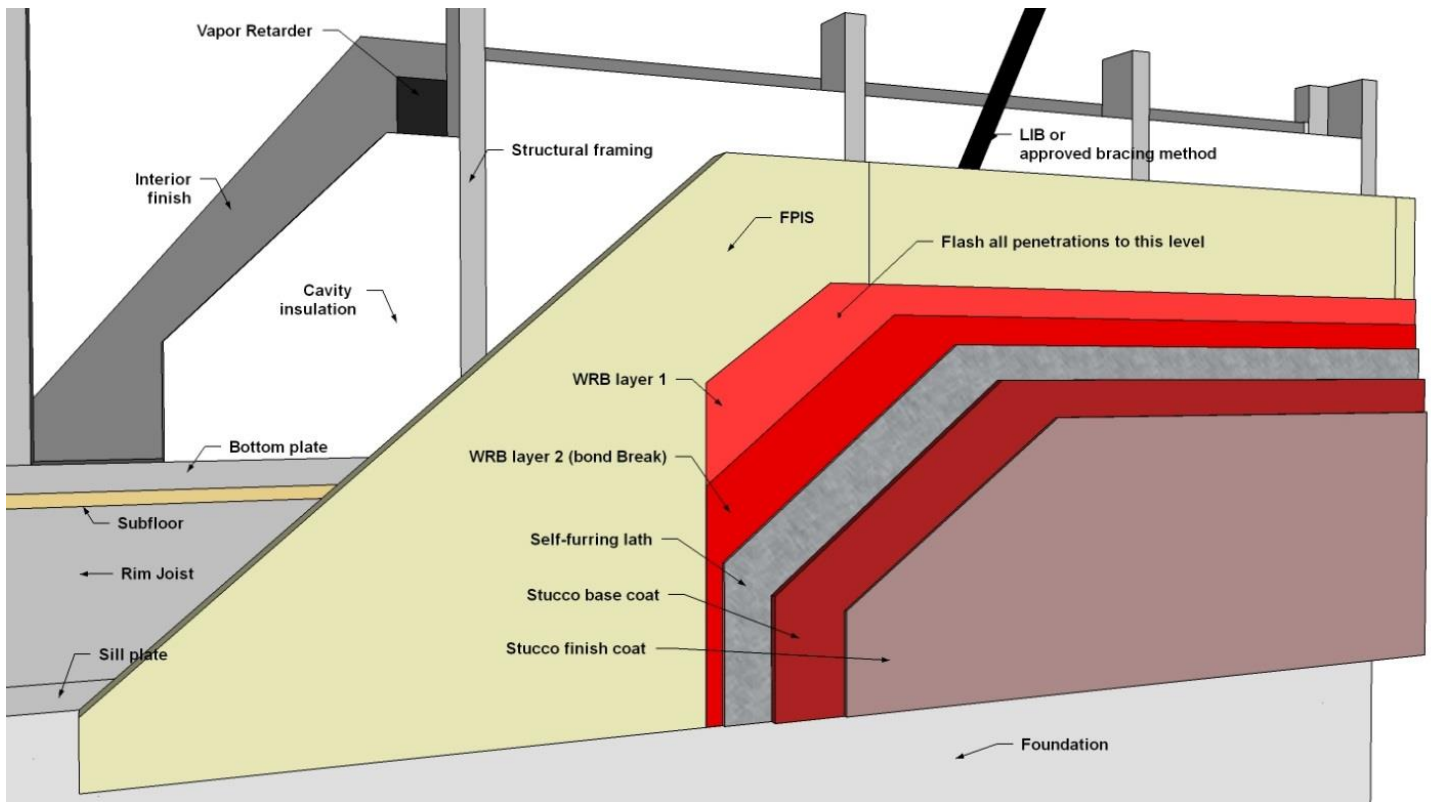


FIGURE 6. WOOD-FRAME WALL WITH LIB AND EXTERIOR FINISH OF FPIS, WRB, DRAINAGE SPACE, AND PC STUCCO⁶

⁶ See the stucco provisions in [IBC Section 2510.6](#) and [IRC Section R703.7.3](#) regarding water resistant barrier (WRB) application. WRB Layer 1 is not necessary where FPIS with taped joints is used as the WRB Layer 1. WRB Layer 2 is not necessarily required where self-furring lath is used to create a drainage space and separate the PC Stucco from bonding to the WRB surface. However, WRB Layer 2 is recommended to provide added protection WRB Layer 1 during installation of lath.

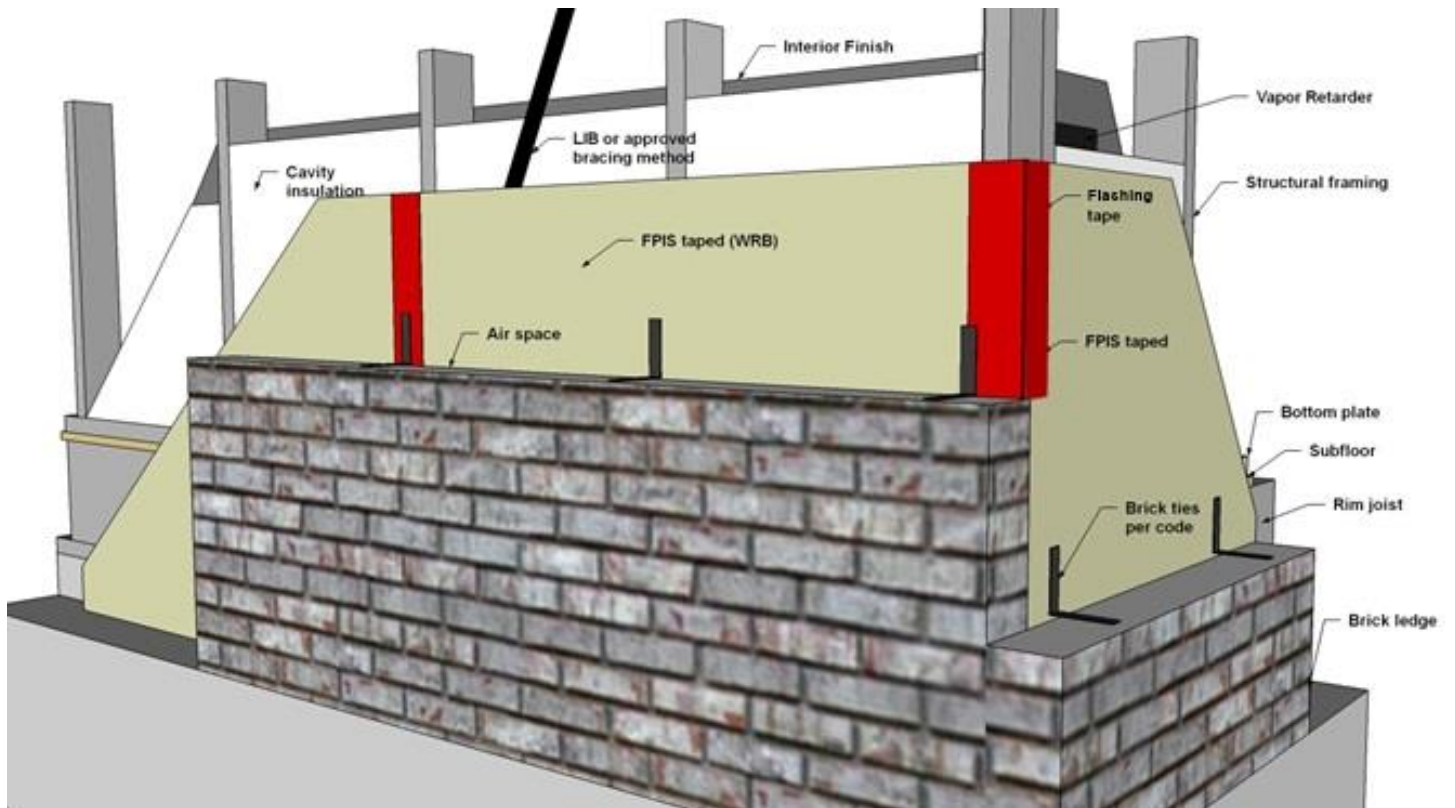


FIGURE 7. WOOD-FRAME WALL WITH LIB AND EXTERIOR FINISH OF FPIS AS WRB AND BRICK VENEER (ANCHORED AND SEPARATELY SUPPORTED)

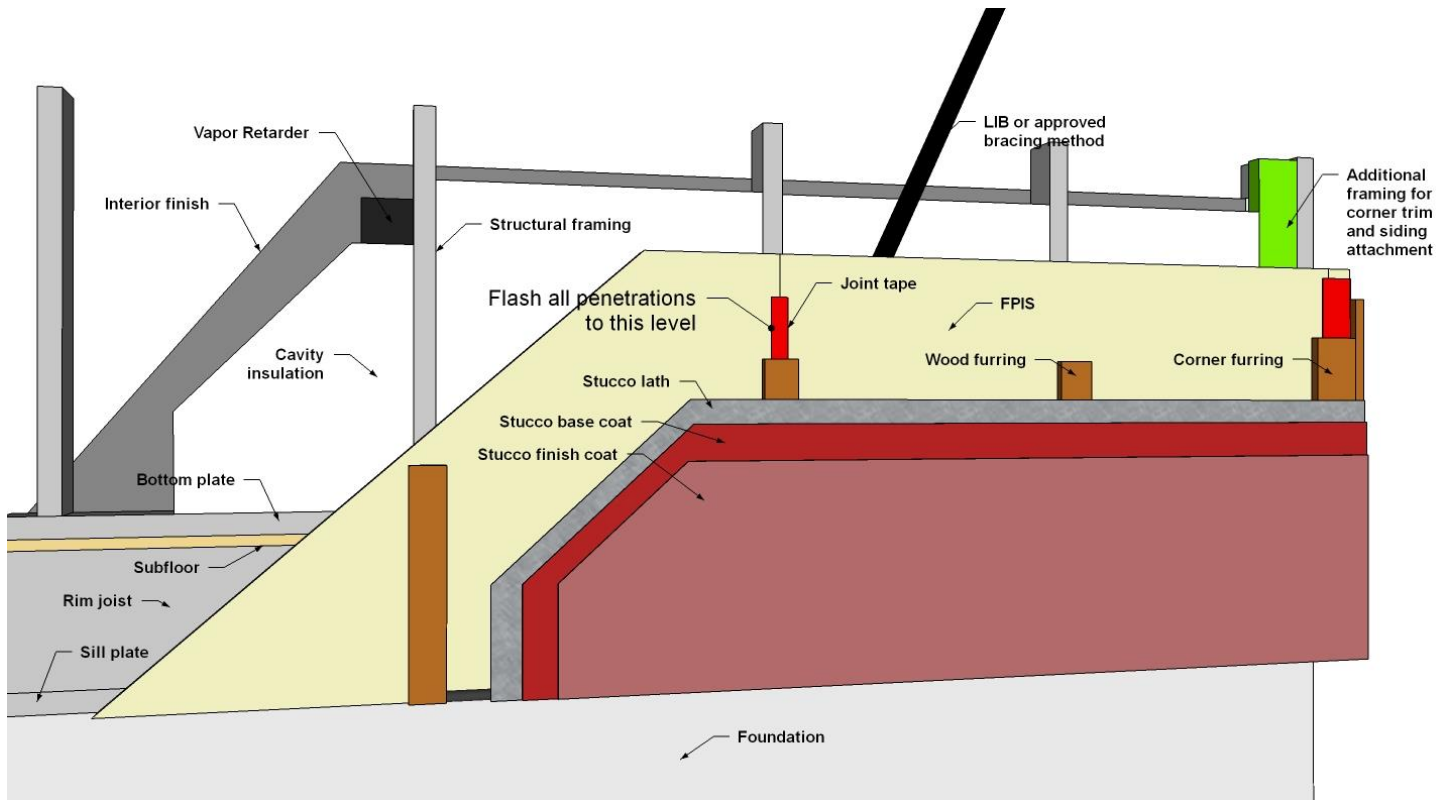


FIGURE 8. WOOD-FRAME WALL WITH LIB BRACING, FPIS AS WRB, FURRING (OR DRAINAGE MAT), LATH, AND STUCCO VENEER⁷

⁷ See the stucco provisions in [IBC Section 2510.6](#) regarding WRB application. The WRB layer would not be required if the FPIS were approved and specified as a WRB and joints sealed with an approved tape or sealing method.

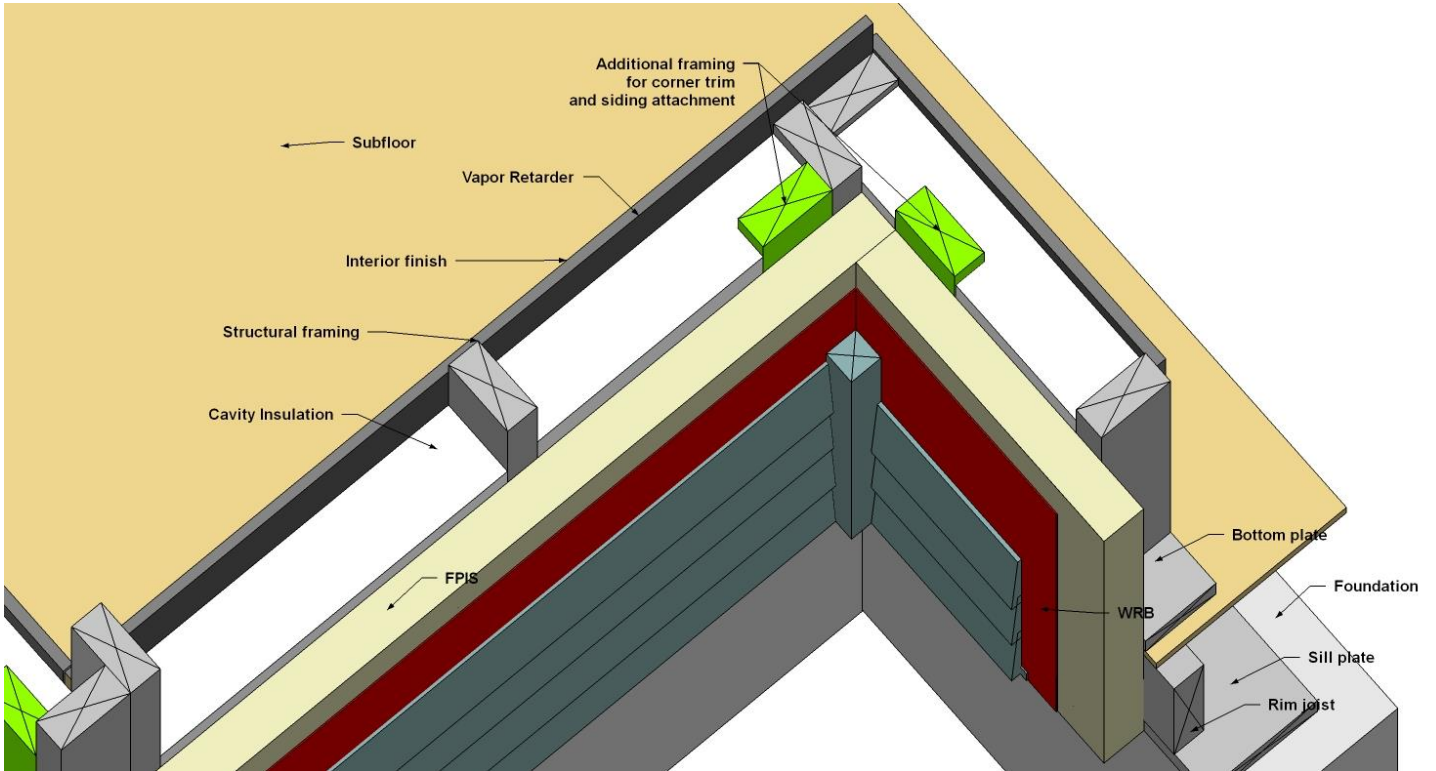


FIGURE 9. INSIDE CORNER: WOOD FRAME WALL WITH CONTINUOUS INSULATION, FPIS, WRB, AND LAP SIDING WITHOUT FURRING (PROVIDE SUFFICIENT FRAMING TO ATTACH SIDING TRIM & SIDING AS WELL AS INTERIOR FINISH.)

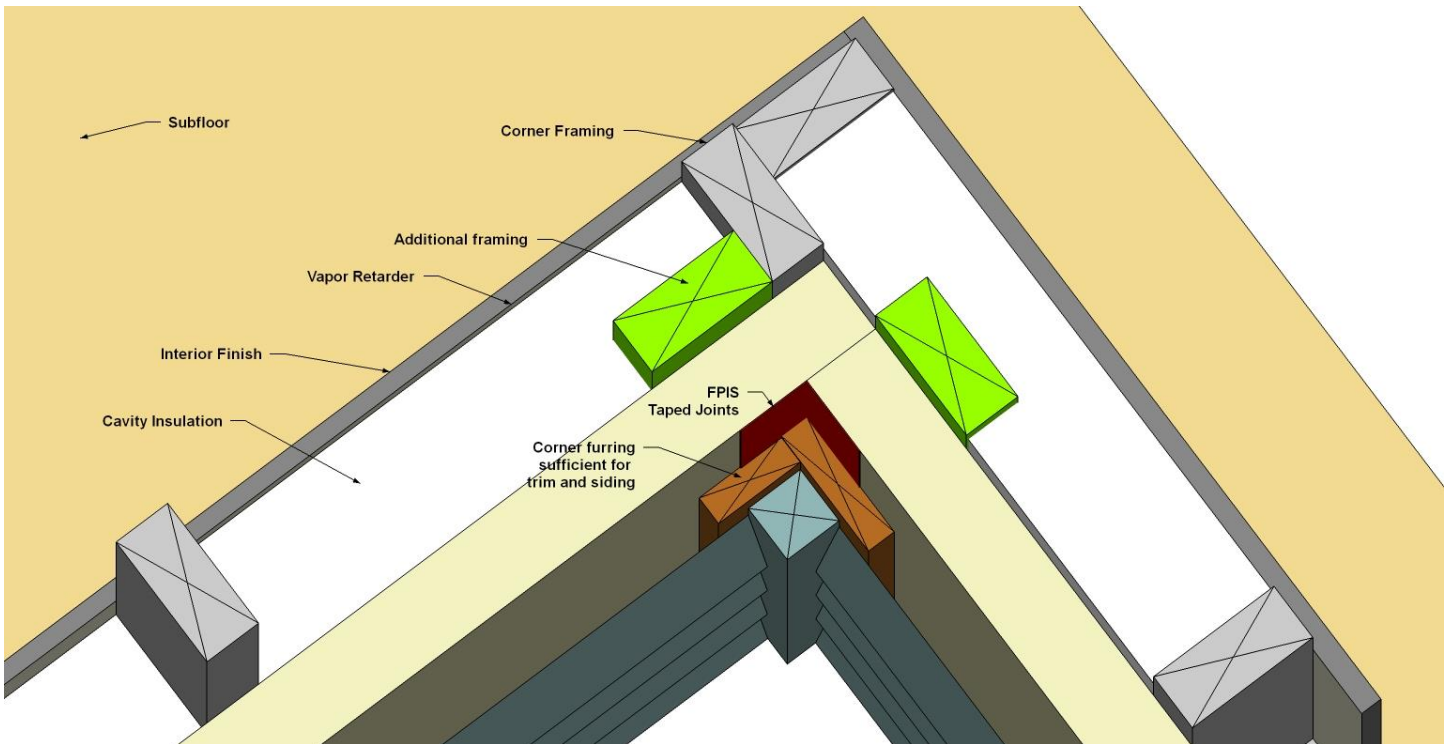


FIGURE 10. INSIDE CORNER: WOOD FRAME WALL WITH CONTINUOUS INSULATION, FPIS TAPED (WRB), FURRING, AND LAP SIDING (PROVIDE SUFFICIENT FRAMING TO ATTACH SIDING TRIM & SIDING AS WELL AS INTERIOR FINISH.)

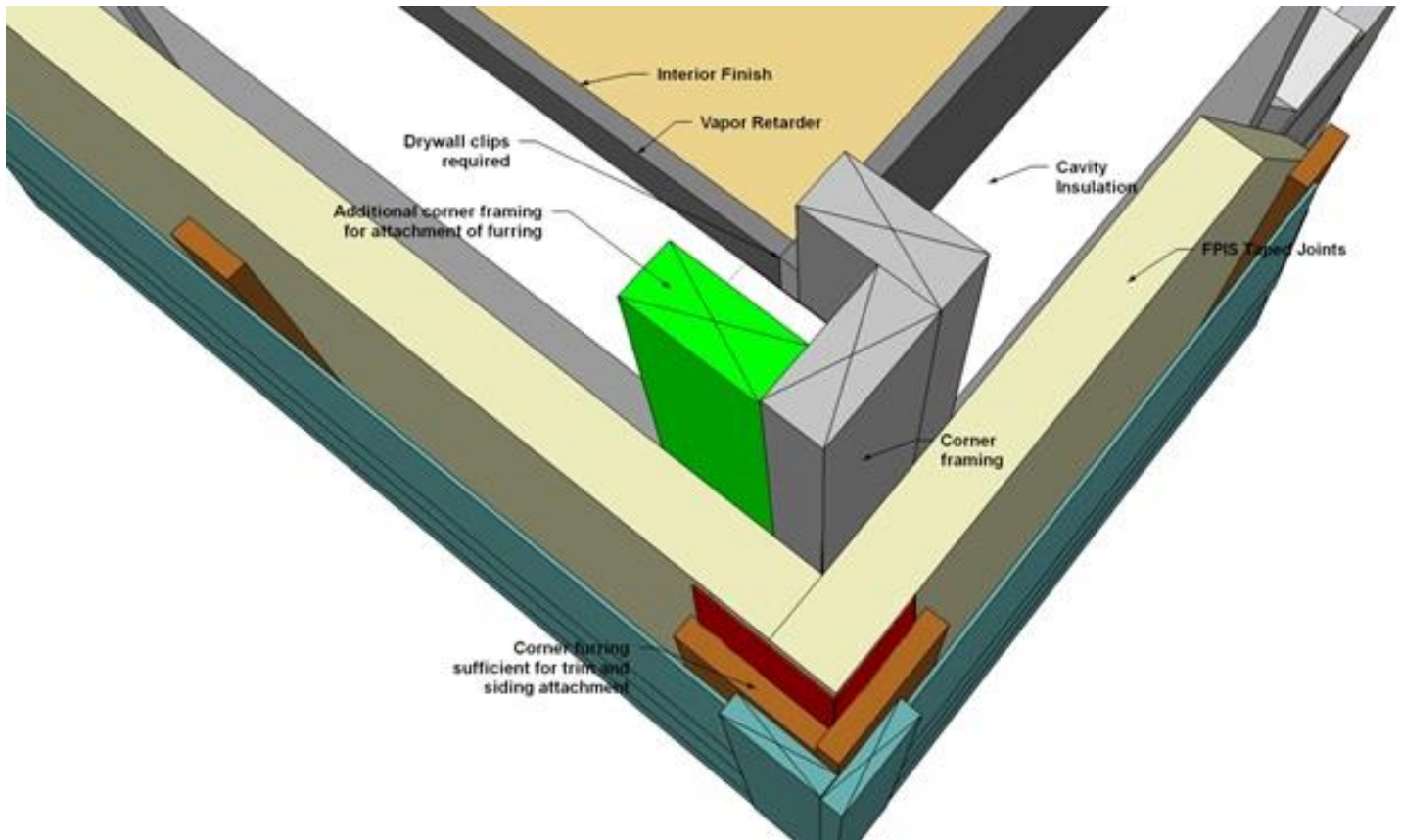


FIGURE 11. OUTSIDE CORNER: WOOD FRAME WALL WITH CONTINUOUS INSULATION, FPIS TAPED (WRB), FURRING, AND LAP SIDING (PROVIDE SUFFICIENT FRAMING TO ATTACH SIDING TRIM & SIDING AS WELL AS INTERIOR FINISH.)

6.2.2 Bottom of Wall

6.2.2.1 Not code required and typically recommended with FPIS thickness over 1"

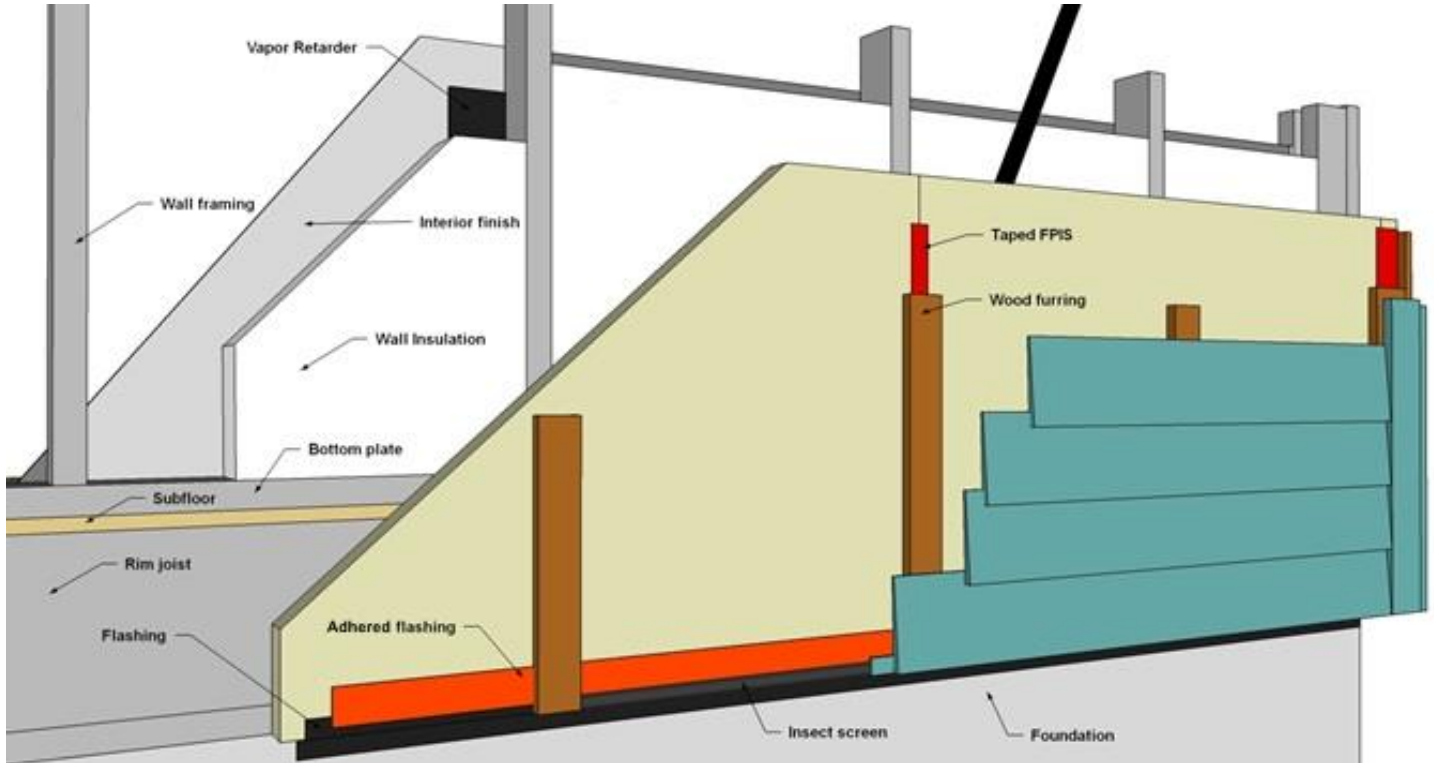


FIGURE 12. BOTTOM OF WALL COVERED IN FPIS WITH FLASHING AND EXTENDING DOWN FOUNDATION

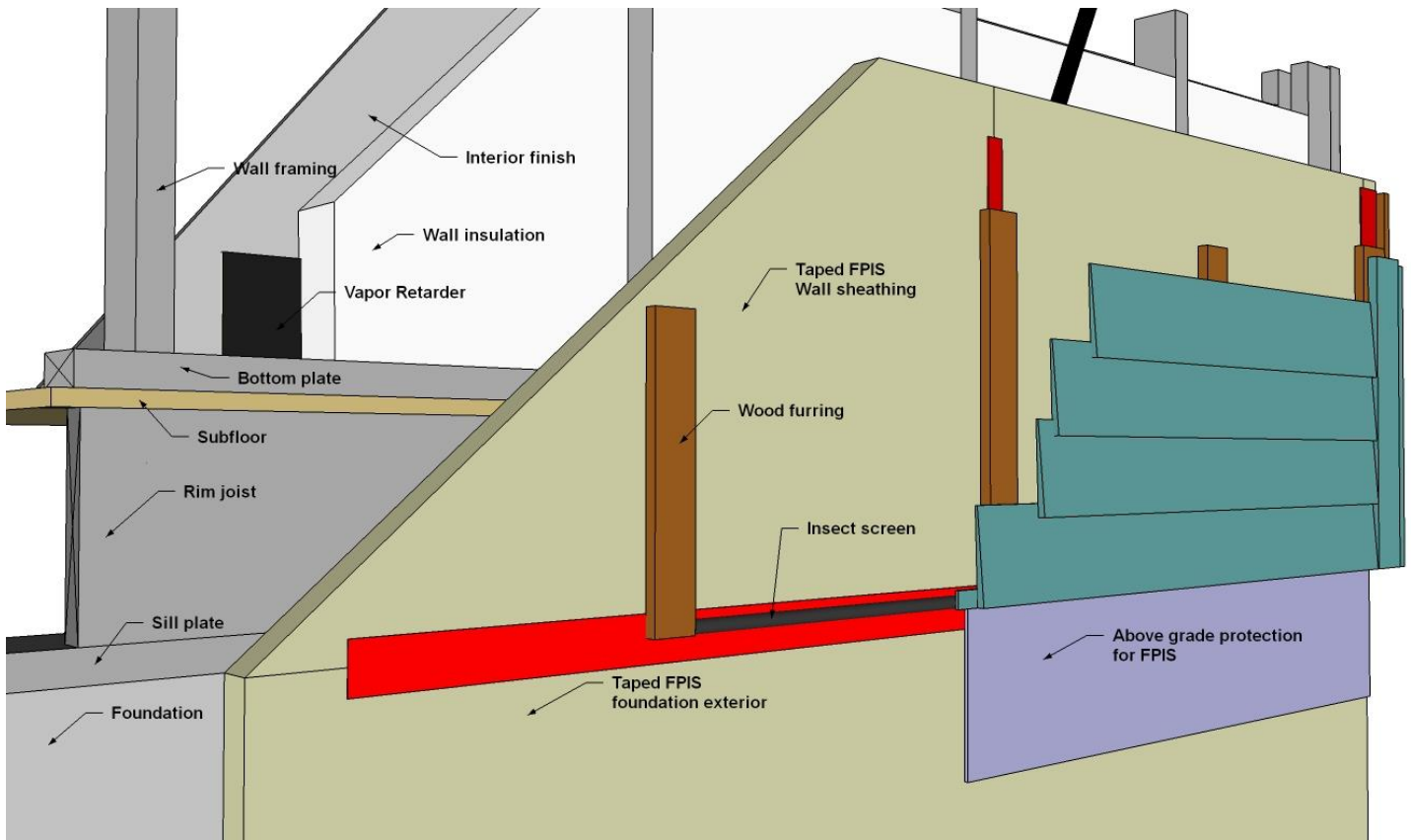


FIGURE 13. FPIS EXTENDING OVER FOUNDATION WITH PROTECTION BOARD WHERE EXPOSED ABOVE GRADE

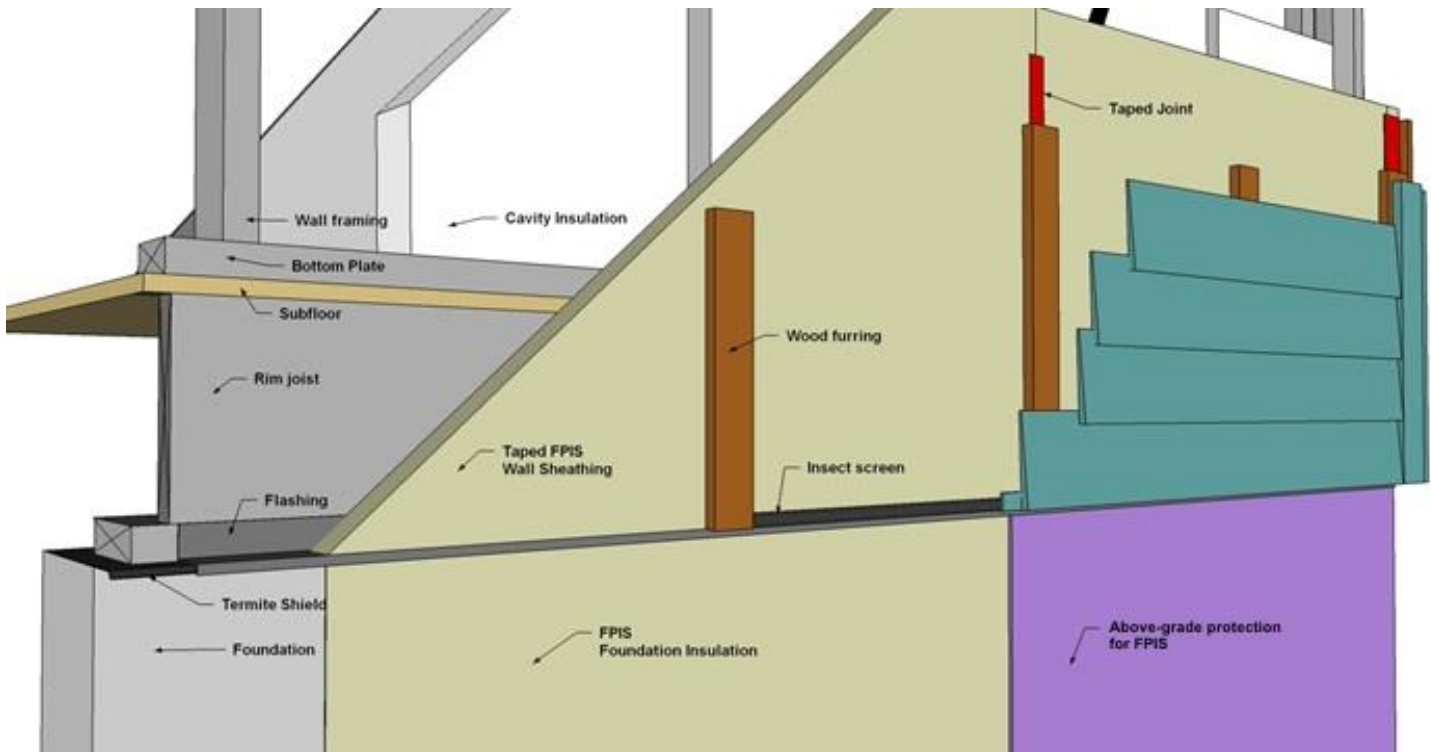


FIGURE 14. FPIS EXTENDING OVER FOUNDATION WITH TERMITE SHIELD, HORIZONTAL MECHANICAL FLASHING, AND PROTECTION BOARD (OR COATING) OVER FPIS WHERE EXPOSED ABOVE GRADE

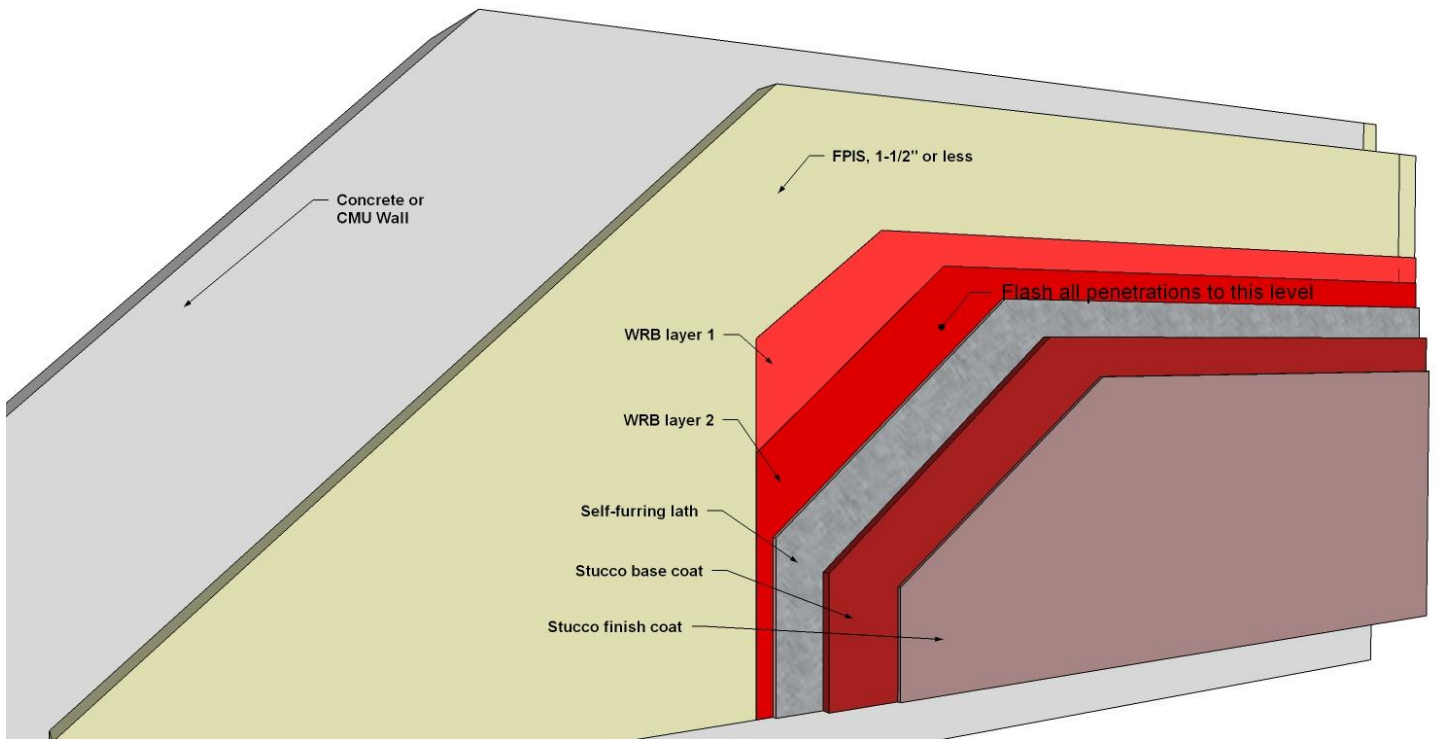


FIGURE 15. CONCRETE OR CMU WALL, (1-1/2" OR LESS) FPIS, 2 LAYERS WRBs, STUCCO [ALTERNATE WRB OPTIONS: (1) ONE SEPARATE WRB BEHIND FPIS (2) FPIS TAPED JOINTS + 1 LAYER WRB (BUILDING PAPER)]

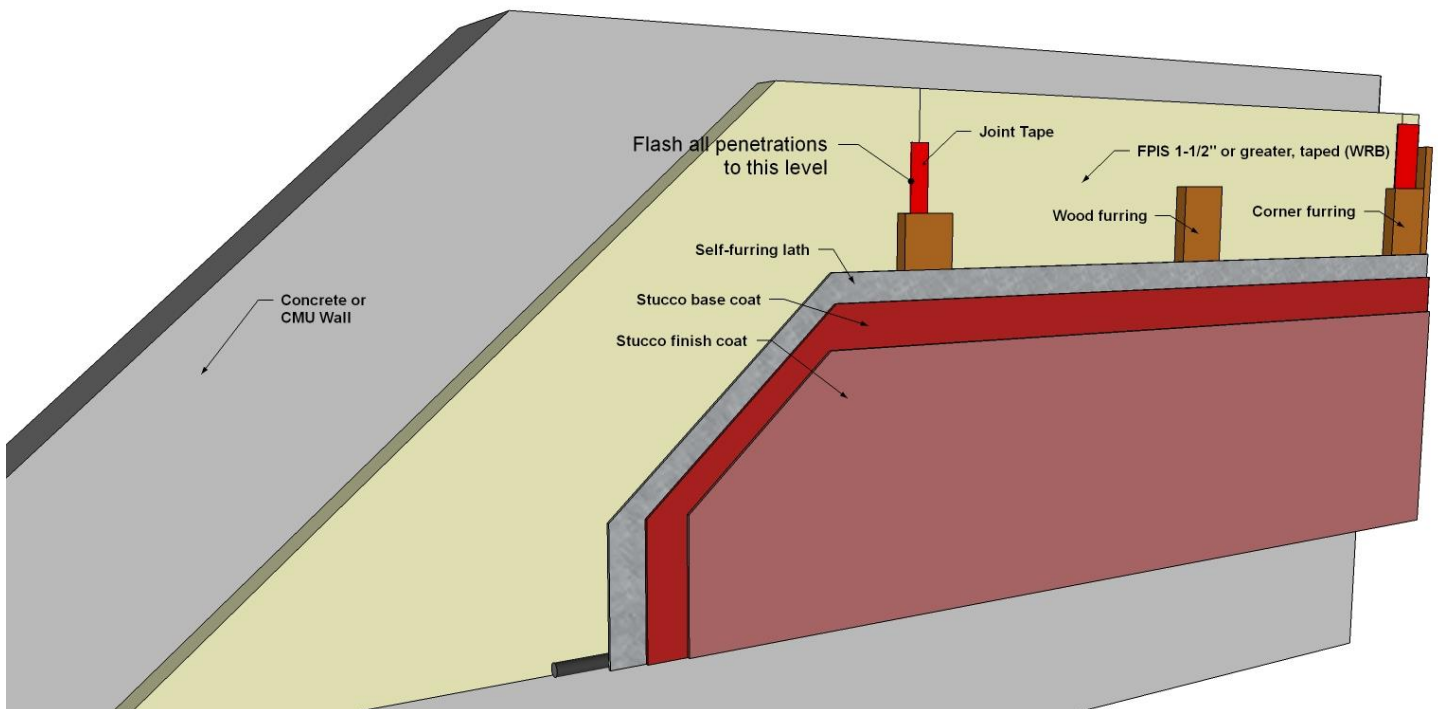


FIGURE 16. CONCRETE OR CMU WALL, (1-1/2" OR GREATER) FPIS (TAPED AS WRB), WOOD FURRING, STUCCO [ALTERNATE WRB OPTIONS: (1) ONE SEPARATE WRB BEHIND FPIS (2) ON SEPARATE WRB IN FRONT OF FPIS]

6.2.3 Top of Wall – Gable with Unconditioned Attic Space

6.2.3.1 Illustrates non-FPIS sheathing at gable

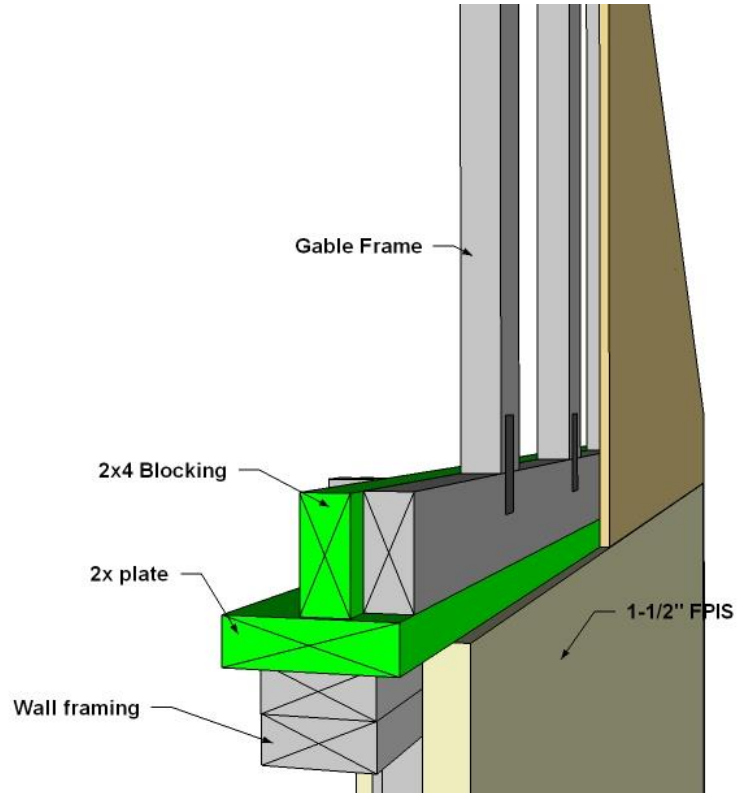


FIGURE 17. TOP OF WALL AT GABLE END WITH GABLE END FRAME SHEATHED WITH WSP & SUPPORTED OVER FPIS WITH 2X, WHICH ALSO EXTENDS TO INSIDE OF WALL TO SUPPLY ATTACHMENT FOR CEILING FINISH (NOTE: BRACING IS NOT SHOWN)

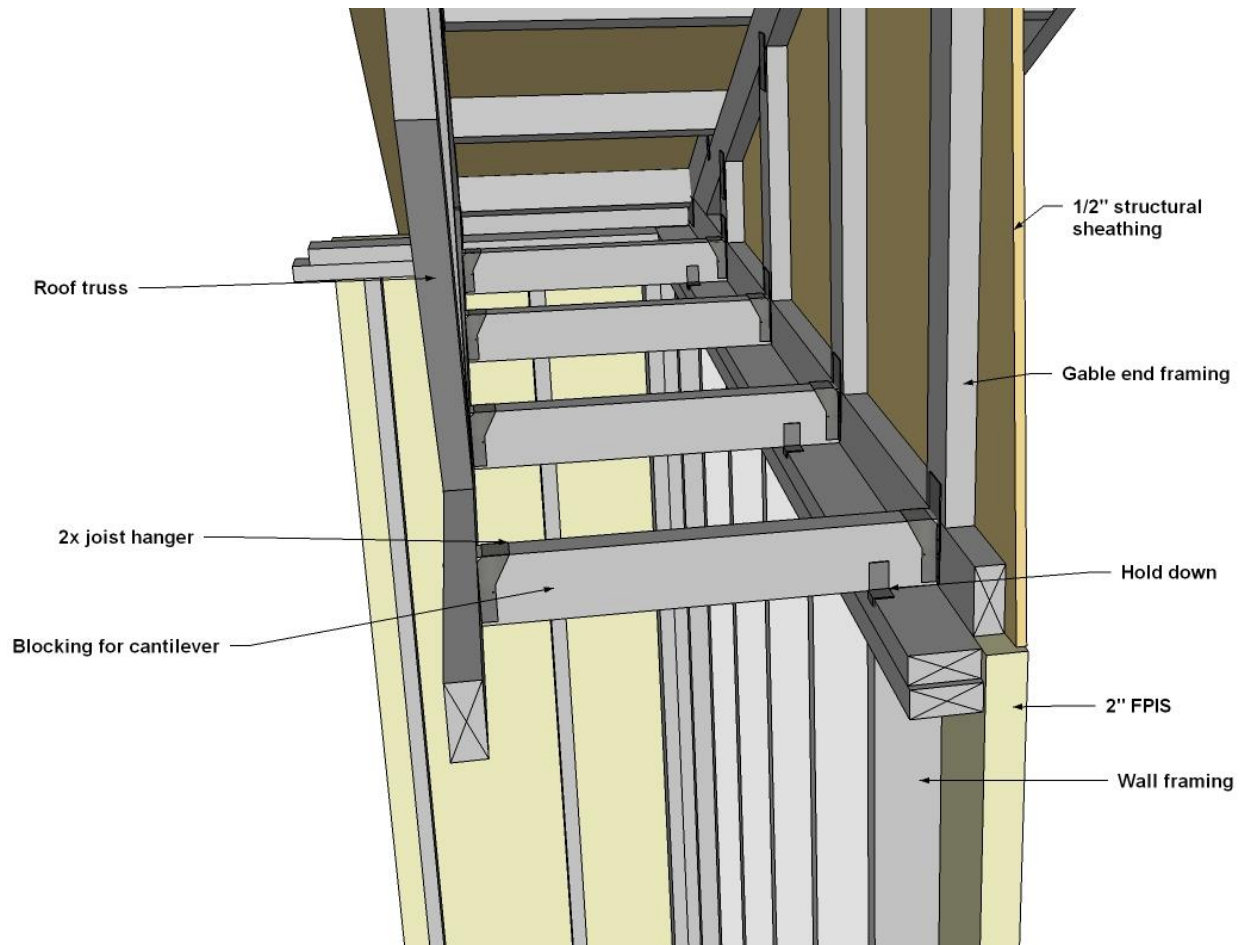


FIGURE 18. TOP OF WALL AT GABLE END WITH GABLE END FRAME SHEATHED WITH WSP & CANTILEVERED OVER WALL (NOTE: GABLE BRACING IS NOT SHOWN. CONTACT COMPONENT MANUFACTURER FOR LOAD-SPECIFIC DETAILS)

6.2.4 Top of Wall – Gable with Conditioned Attic Space

6.2.4.1 Illustrates FPIS sheathing at gable

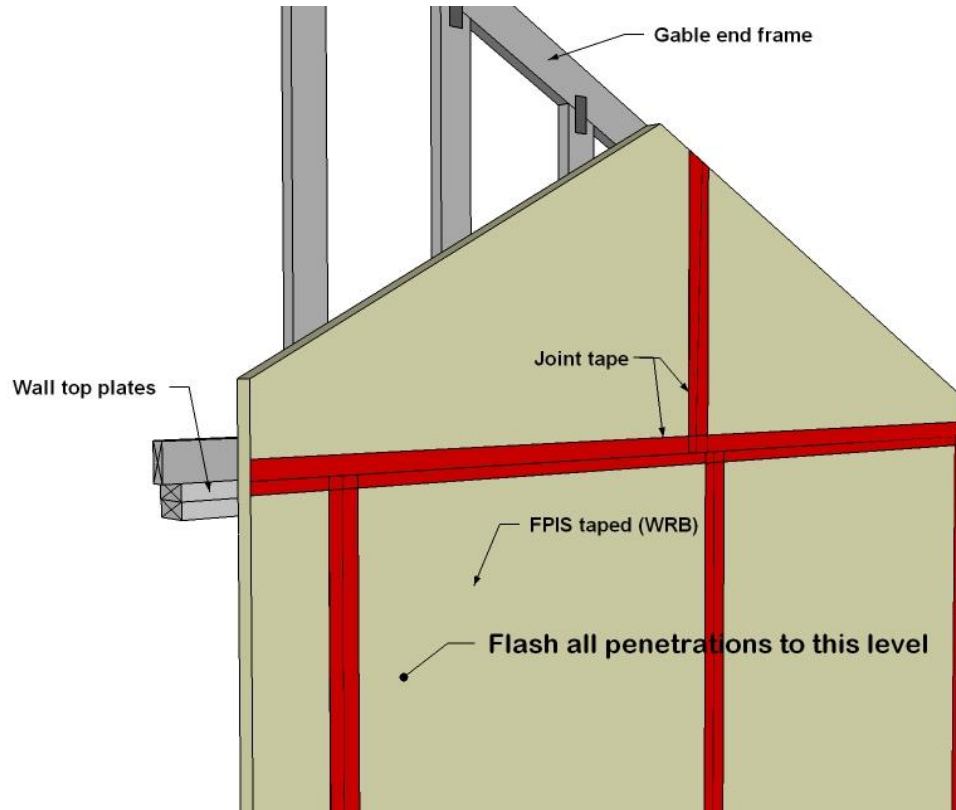


FIGURE 19. TOP OF WALL AT GABLE END WITH GABLE END FRAME SHEATHED WITH FPIS CONTINUOUS FROM WALL BELOW
(NOTE: BRACING IS NOT SHOWN.)

6.2.5 Top of Wall – Eave

6.2.5.1 Rafter, standard truss heel, high truss heel, and cantilevered truss

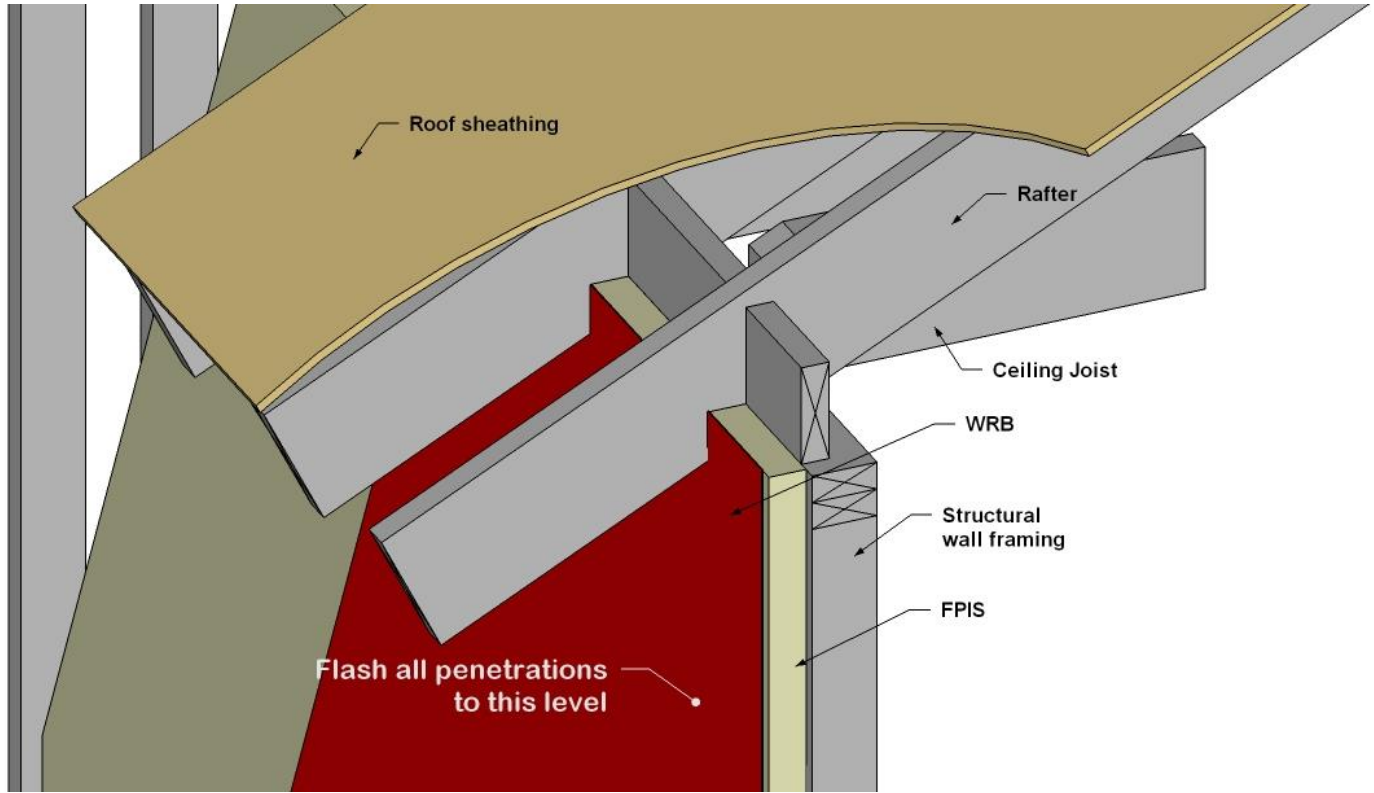


FIGURE 20. TOP OF WALL AT EAVE WITH RAFTER CONSTRUCTION

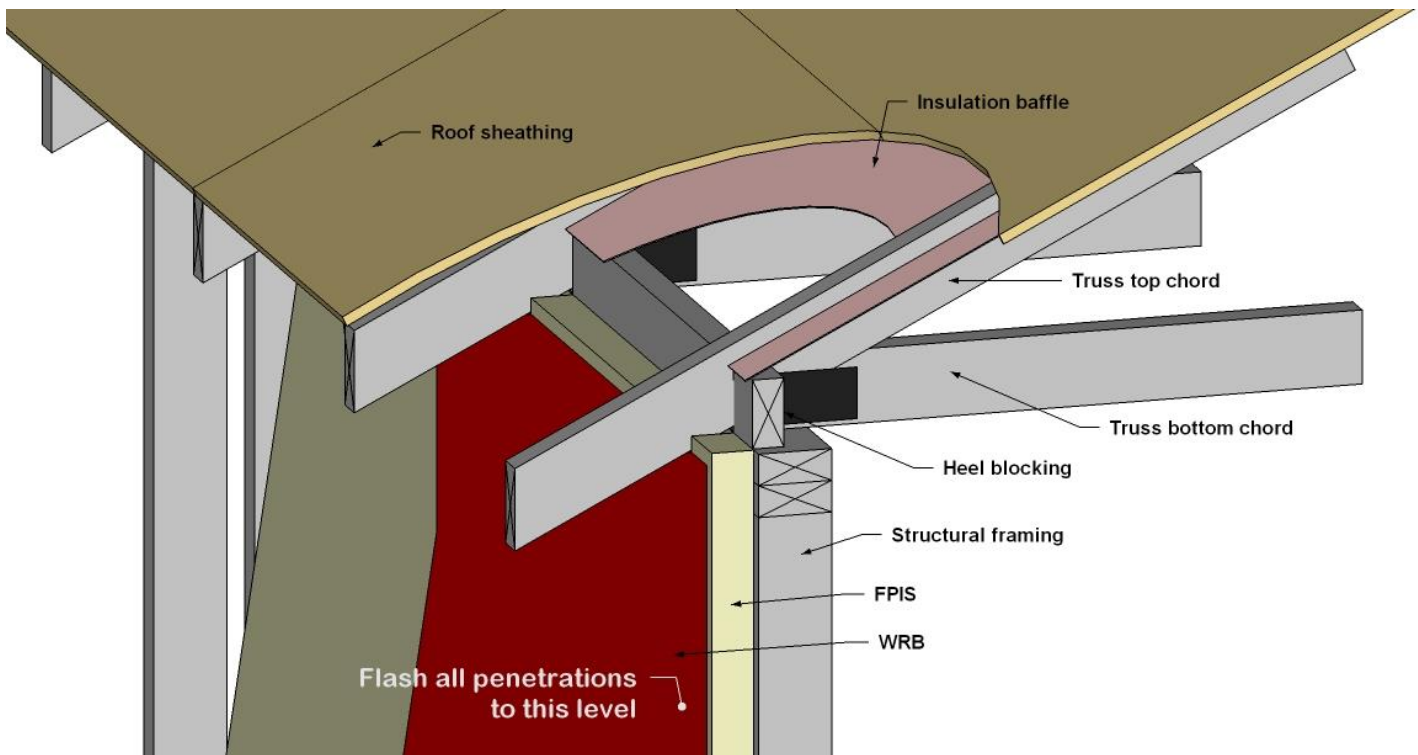


FIGURE 21. TOP OF WALL AT EAVE WITH STANDARD HEEL TRUSS

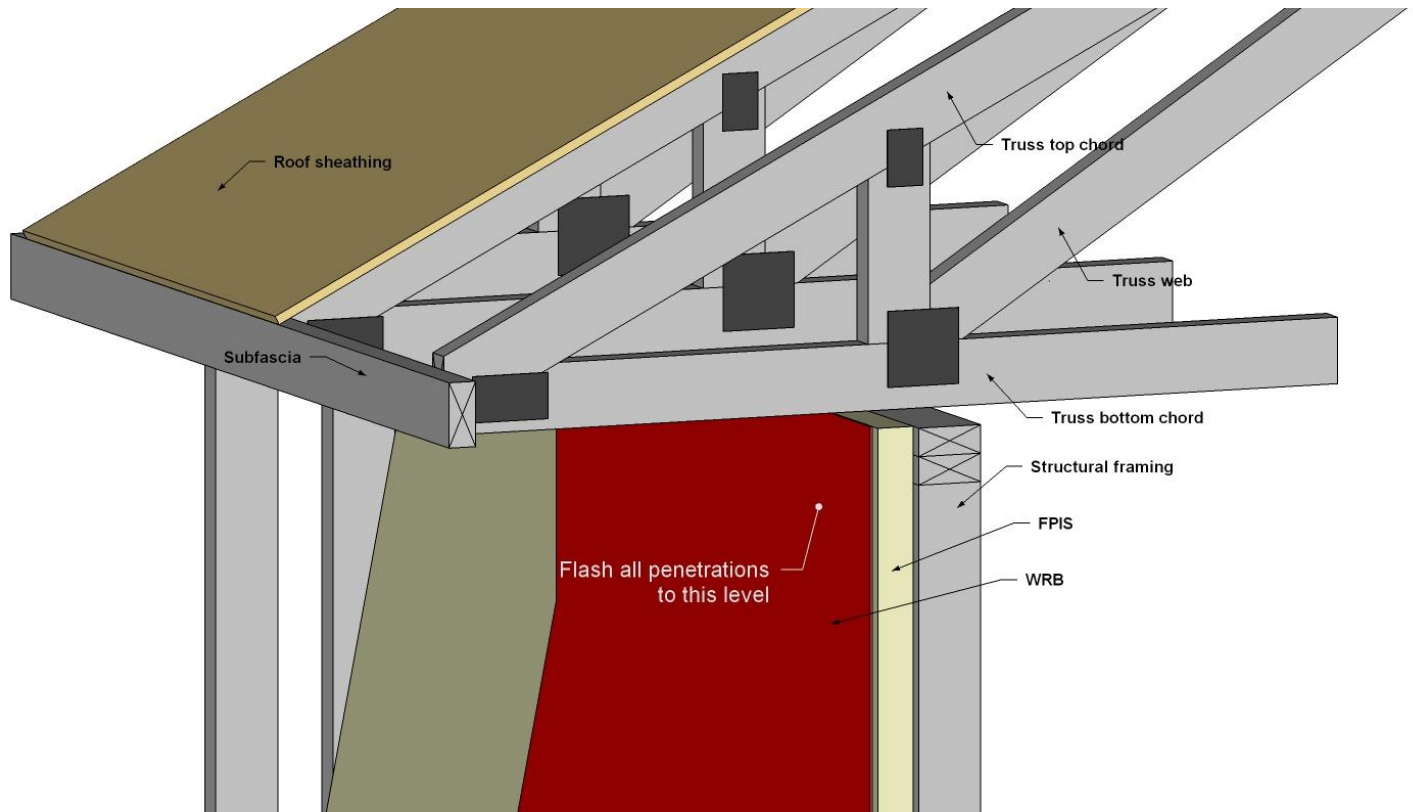


FIGURE 22. TOP OF WALL AT EAVE WITH CANTILEVER TRUSS

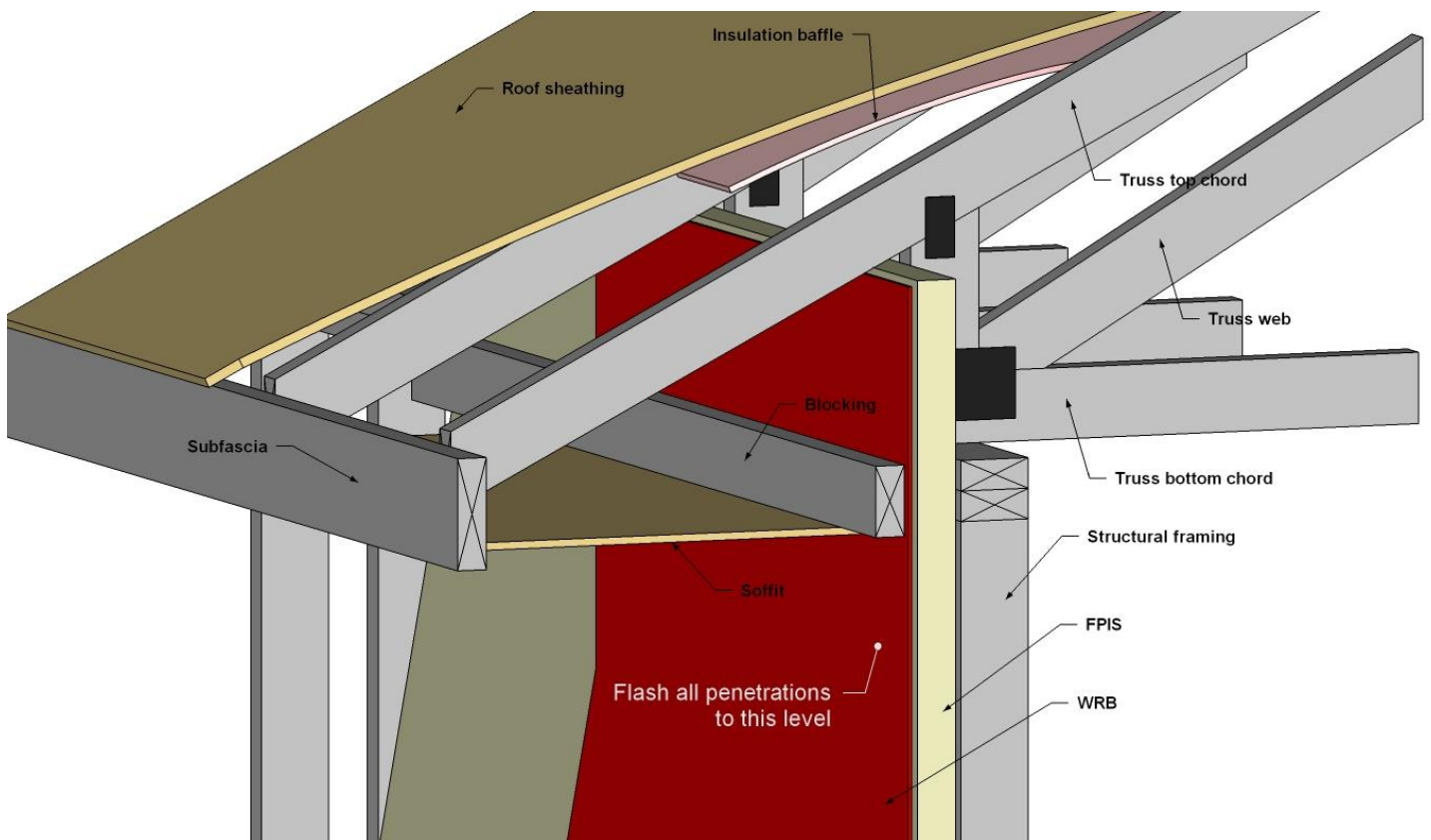


FIGURE 23. TOP OF WALL AT ENERGY HEEL TRUSS

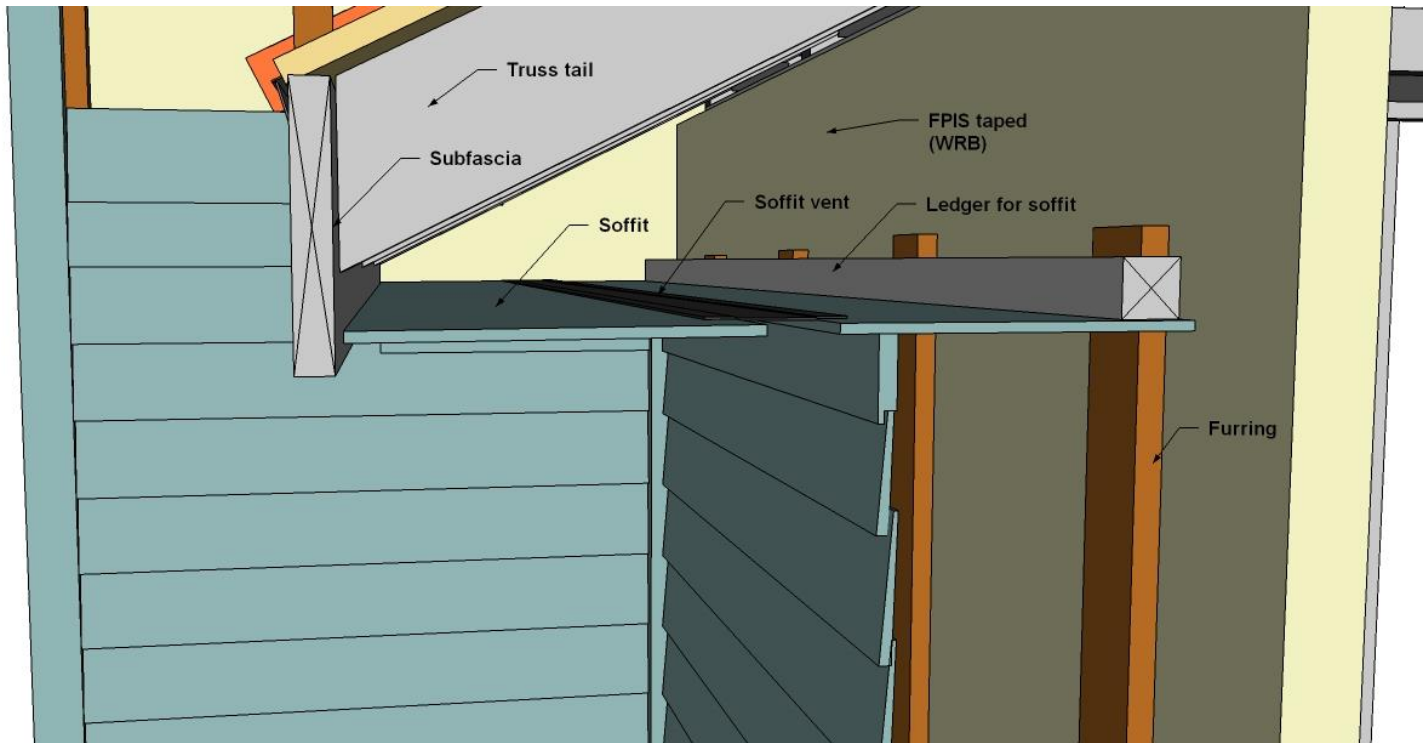


FIGURE 24. TOP OF WALL STANDARD TRUSS EAVE DETAIL WITH EAVE LEDGER ATTACHED TO STRUCTURAL FRAMING THROUGH FPIS

6.2.6 Roof Intersection with Wall

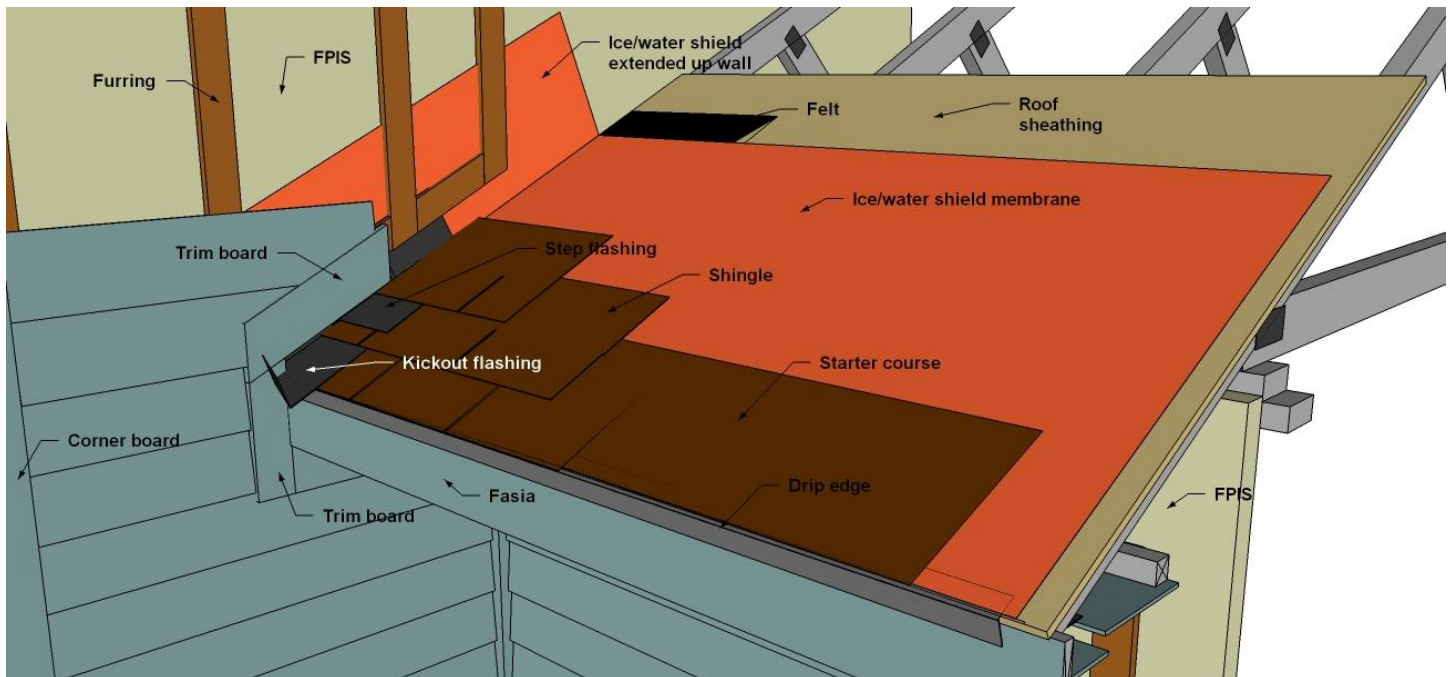


FIGURE 25. ROOF INTERSECTING WITH WALL (VIEW FROM OUTSIDE)

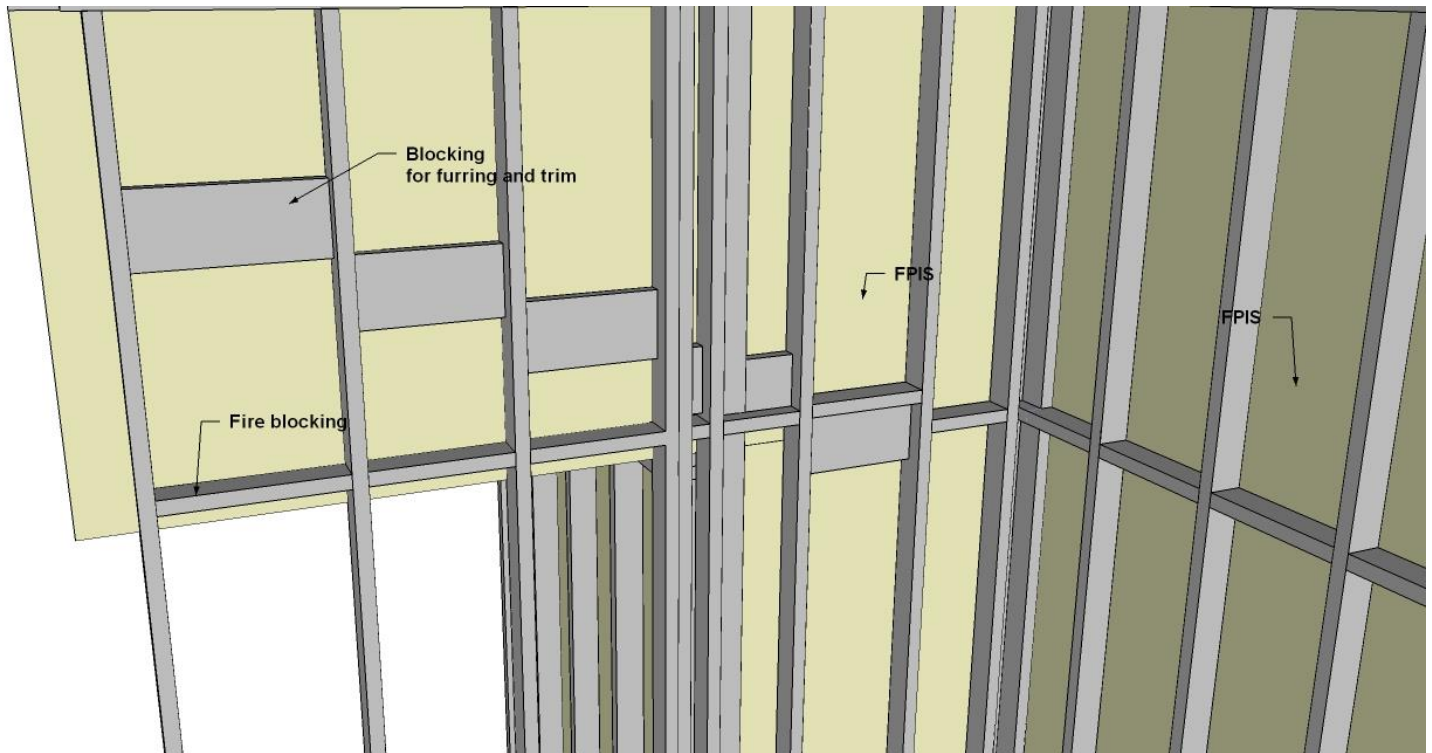


FIGURE 26. ROOF INTERSECTING WITH WALL (VIEW FROM INSIDE SHOWING BLOCKING)

6.2.7 Deck Ledger

6.2.7.1 2" FPIS CI at patio door opening (two views of same application) with 1" FPIS behind ledger⁸

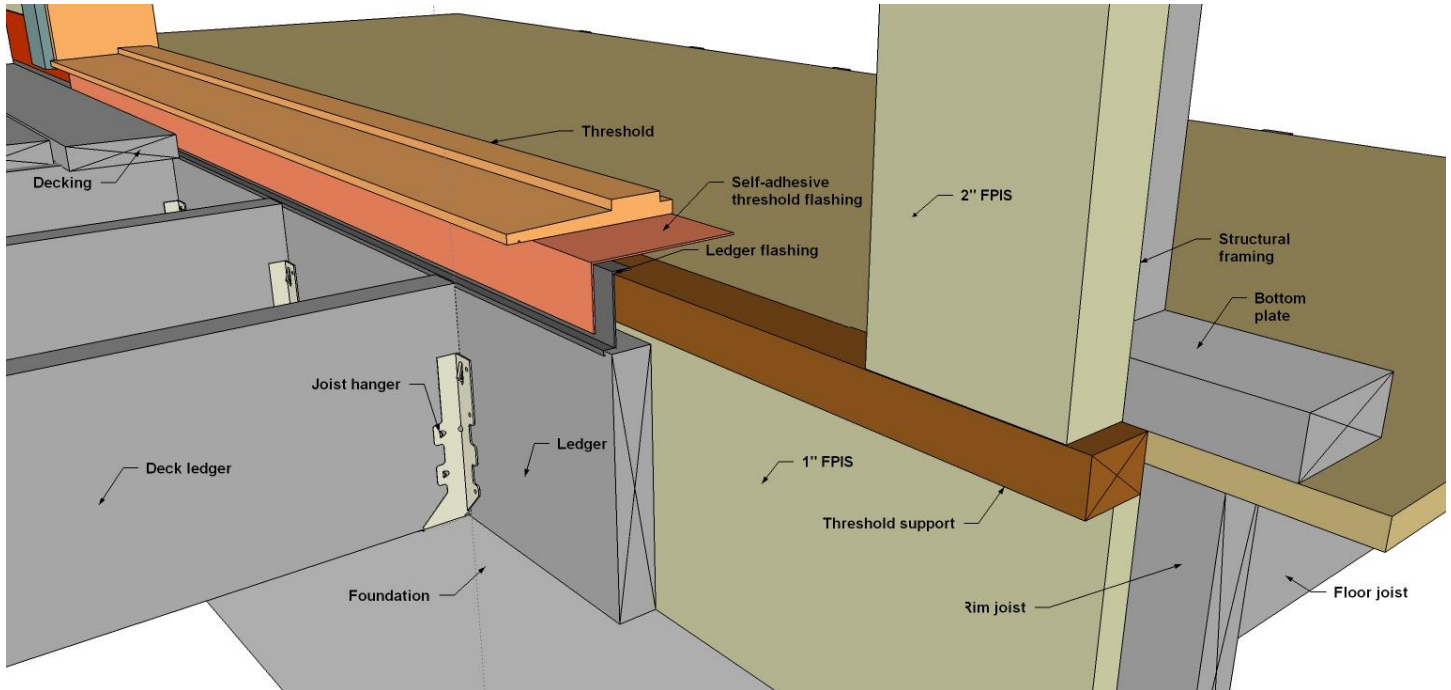


FIGURE 27. DECK LEDGER – 2" FPIS WALL SHEATHING, 1" FPIS BEHIND LEDGER AT PATIO DOOR OPENING

⁸ An alternative is to specify a separately supported deck. For additional information, see [IBC Section 1604.8.3](#), [IRC Section R507](#), and [AWC TR 12](#)

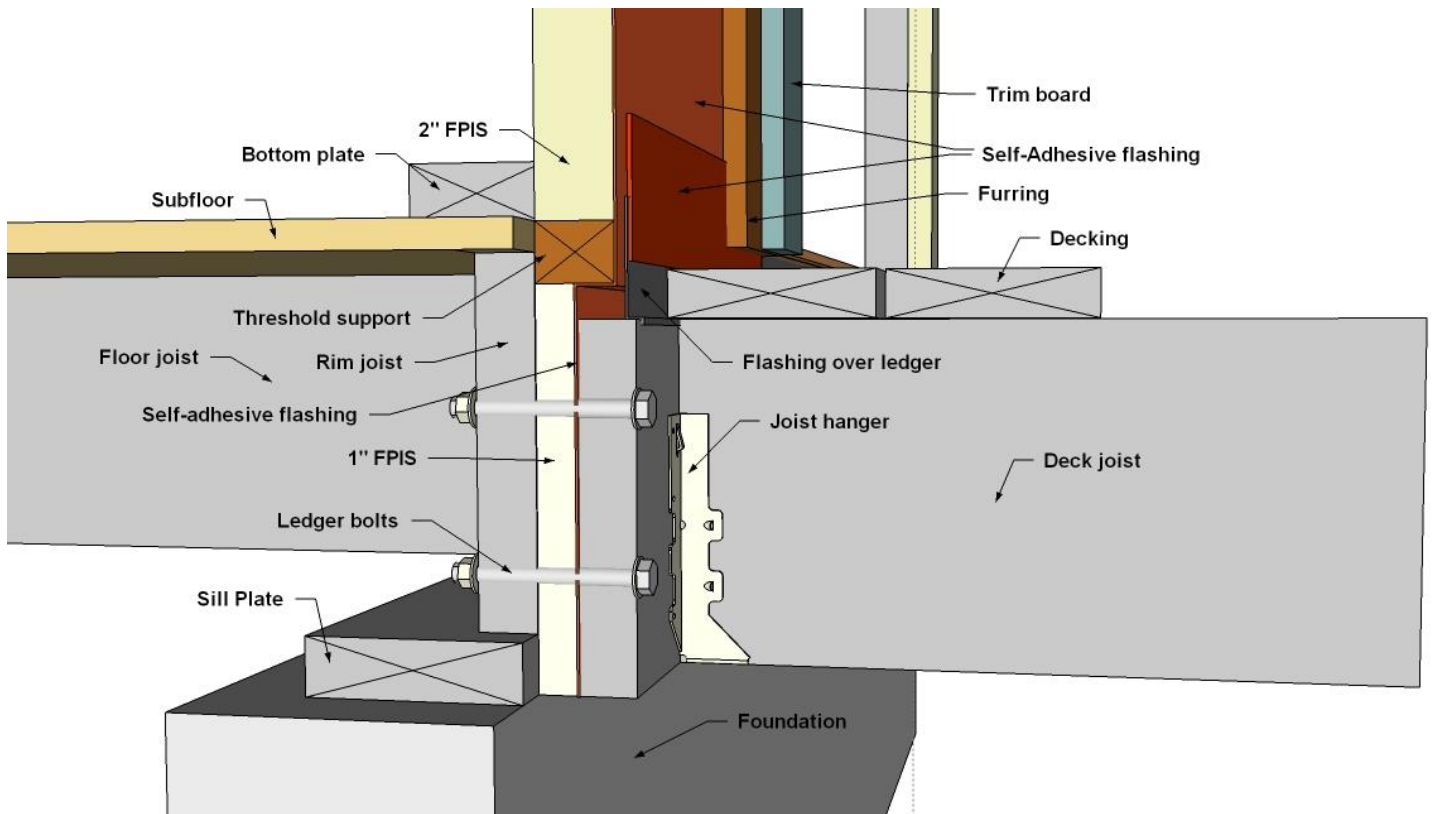


FIGURE 28. DECK LEDGER – 2" FPIS WALL SHEATHING, 1" FPIS BEHIND LEDGER AT RIM⁹

⁹ Deck ledger connect to house through FPIS must be designed.

6.3 Window/Door Penetration Details

6.3.1 The following details are for support and weather resistance

6.3.2 The following details include windows with integral mounting flanges.

6.3.3 Frame walls as required by the applicable code. Ensure rough opening is square and true. Ensure appropriate framing in accordance with window installation method selected and support for FPIS edges is provided.

6.3.4 Standard Installation

6.3.4.1 Standard installation concept with window flanges mounted directly over a limited thickness of FPIS. The most common method for installing windows in walls with up to approximately 2-inches-thick FPIS and using FPIS as the WRB. Use of a separate WRB material is also common and acceptable with appropriate installation and detailing.

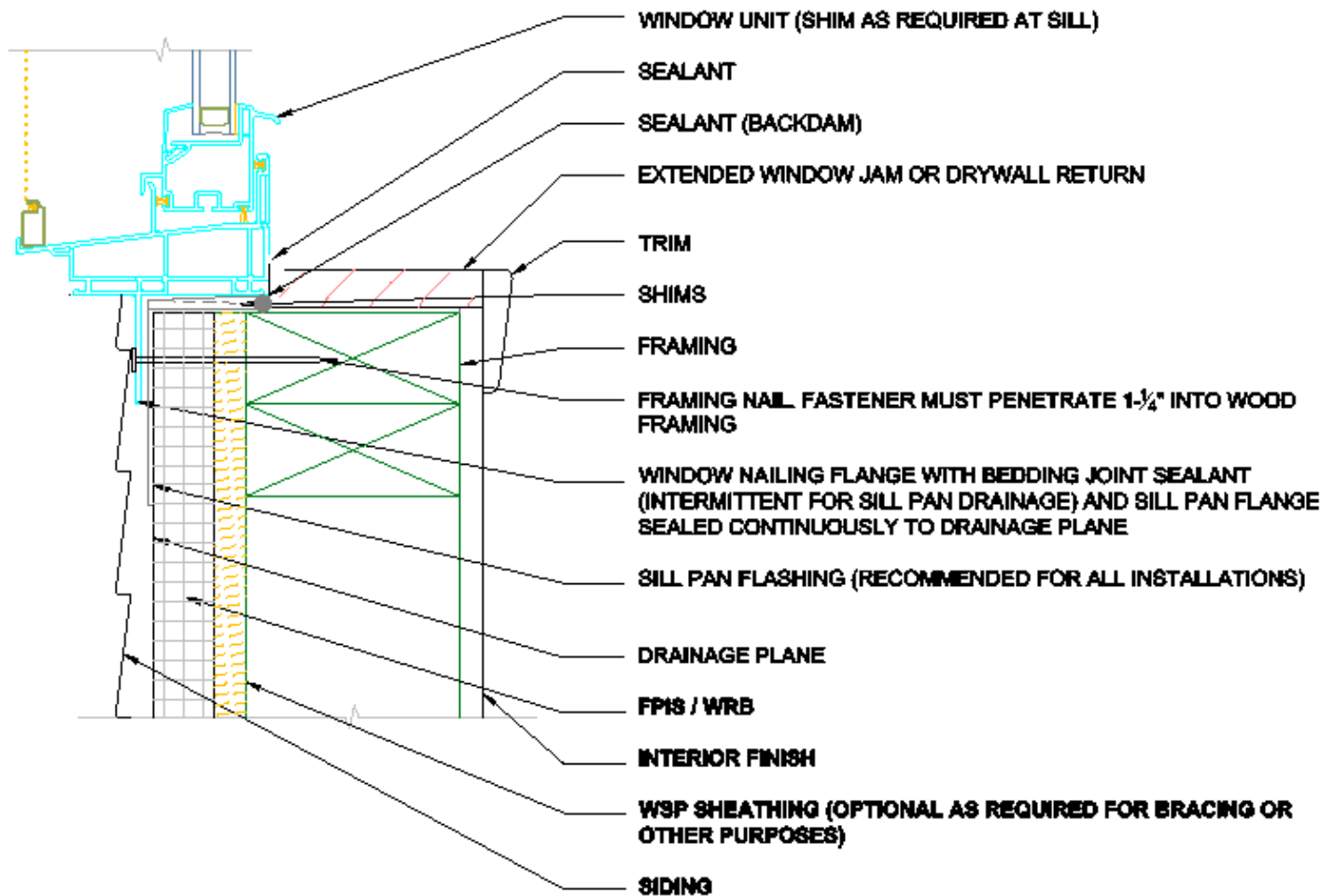


FIGURE 29. STANDARD INSTALLATION – SILL

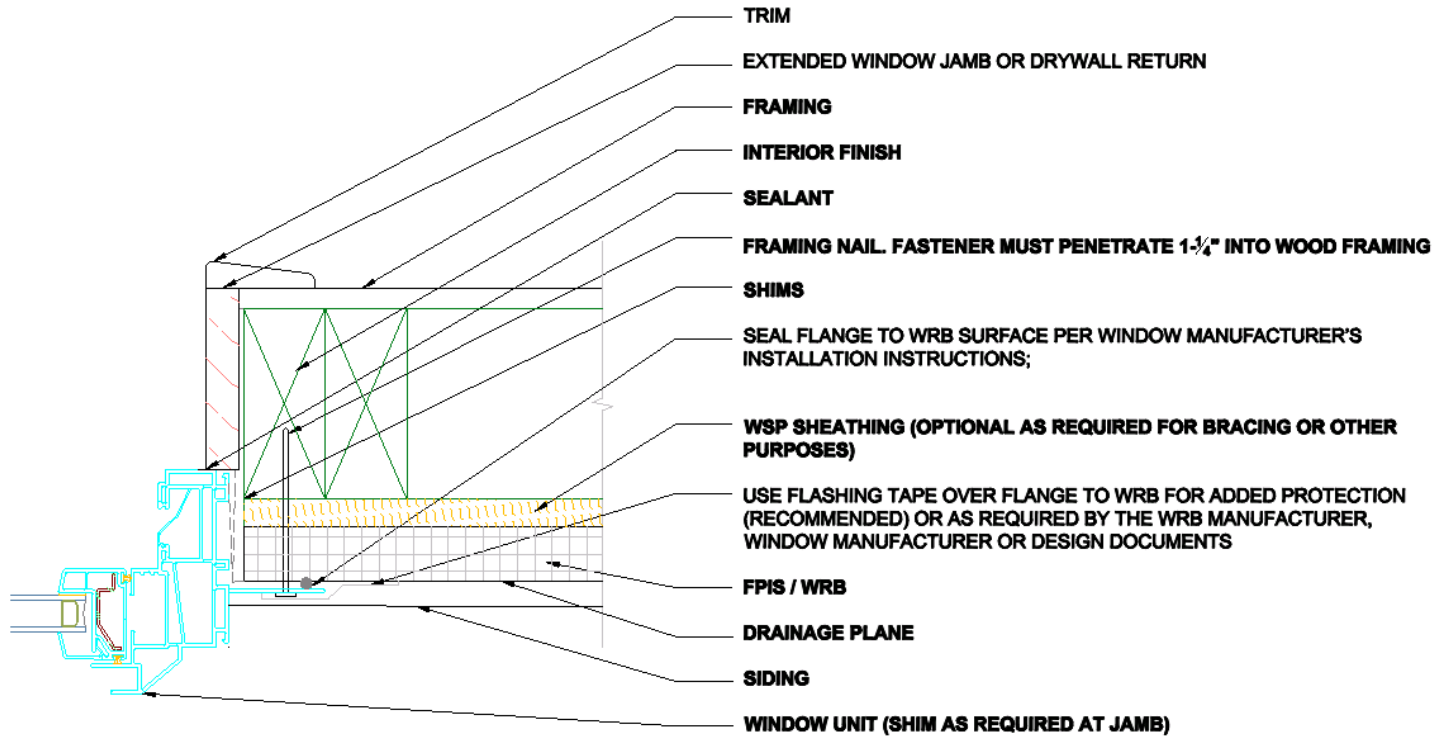


FIGURE 30. STANDARD INSTALLATION – JAMBS

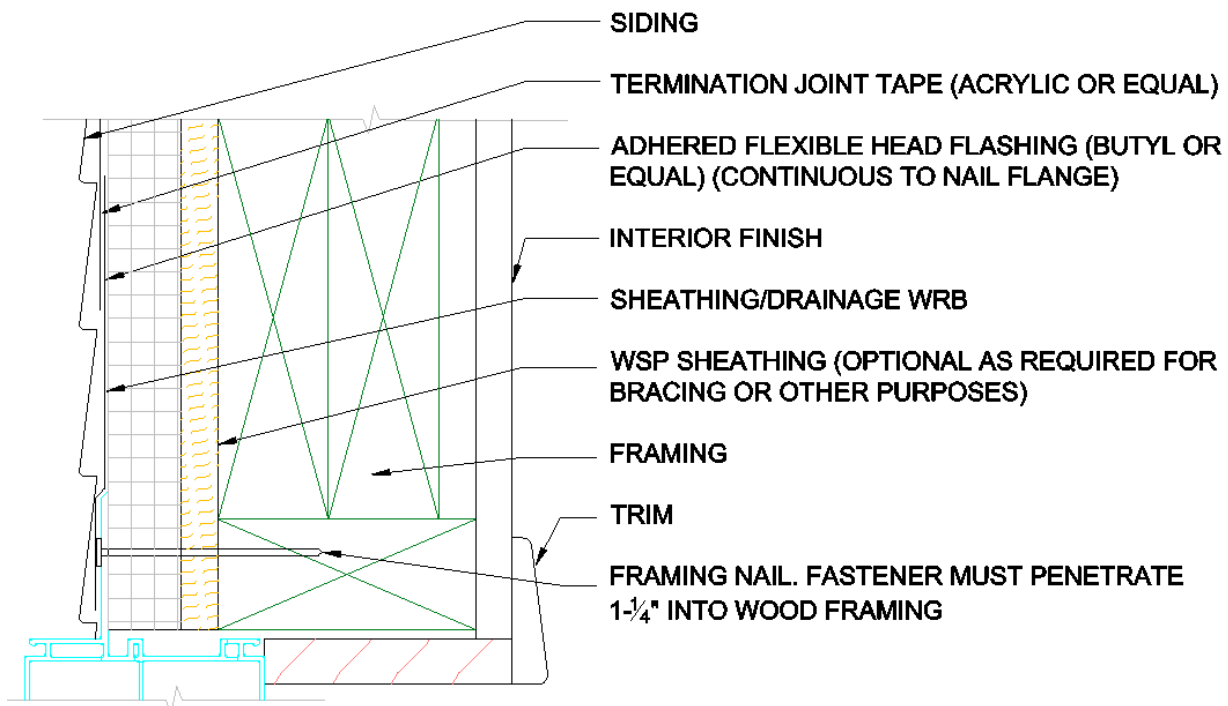


FIGURE 31. STANDARD INSTALLATION – HEADER

6.3.5 Lumber Window Buck Installation

- 6.3.5.1 This concept is a common method for installing windows in walls with generally more than 1½ to 2-inches-thick FPIS and using FPIS as the WRB. Use of a separate WRB material is also common and acceptable with appropriate installation and detailing.

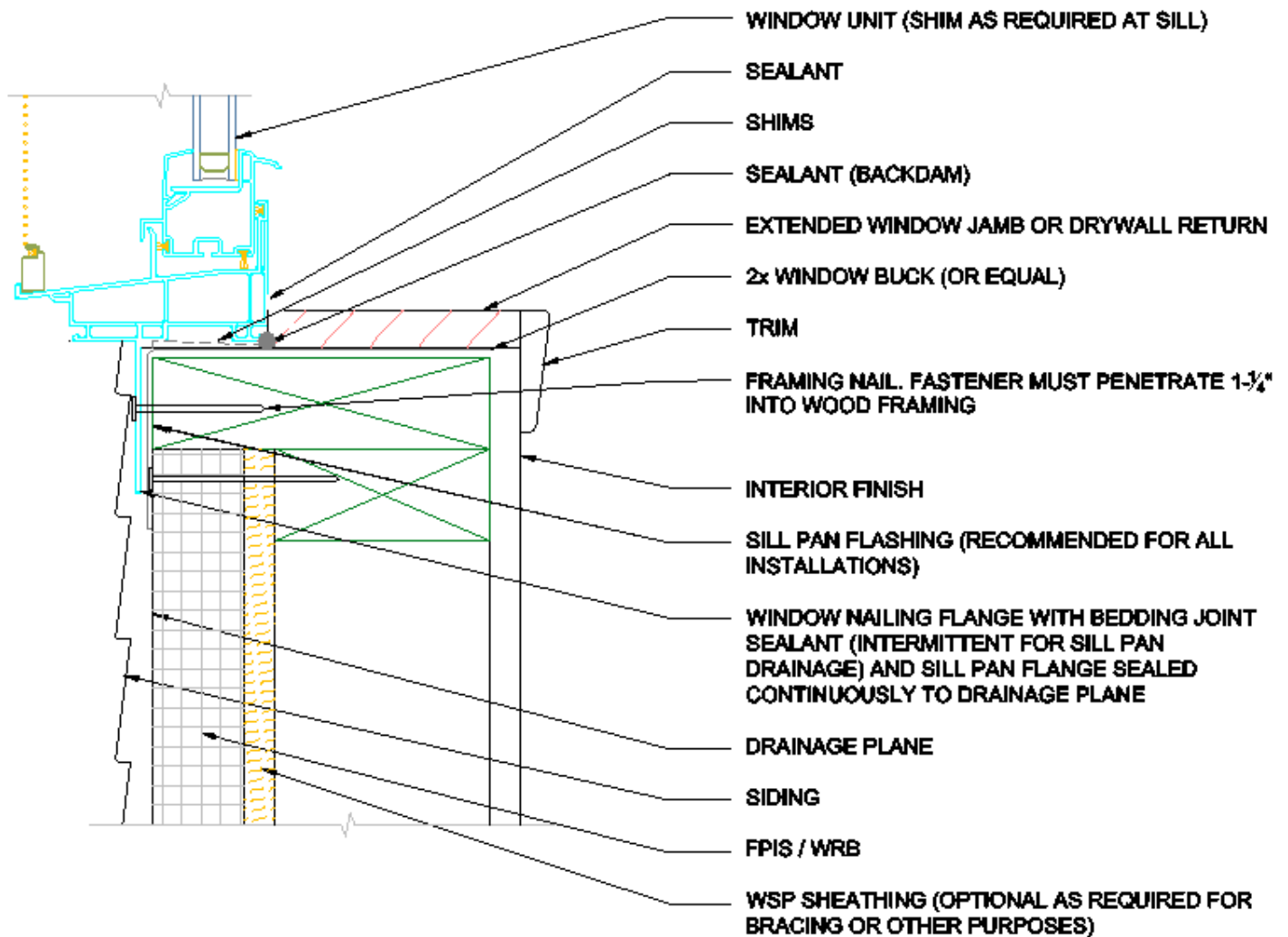


FIGURE 32. WOOD BUCK INSTALLATION – SILL

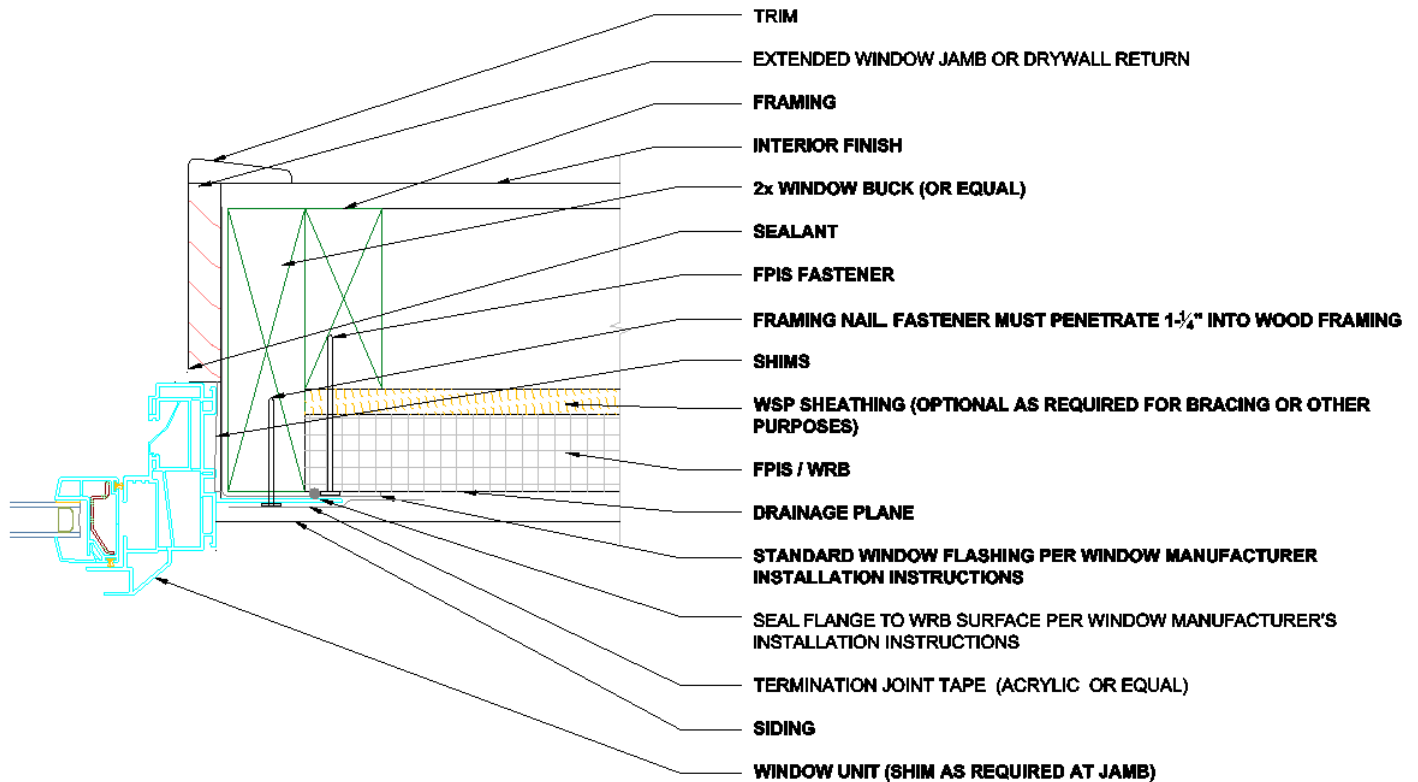


FIGURE 33. WOOD BUCK INSTALLATION – JAMB

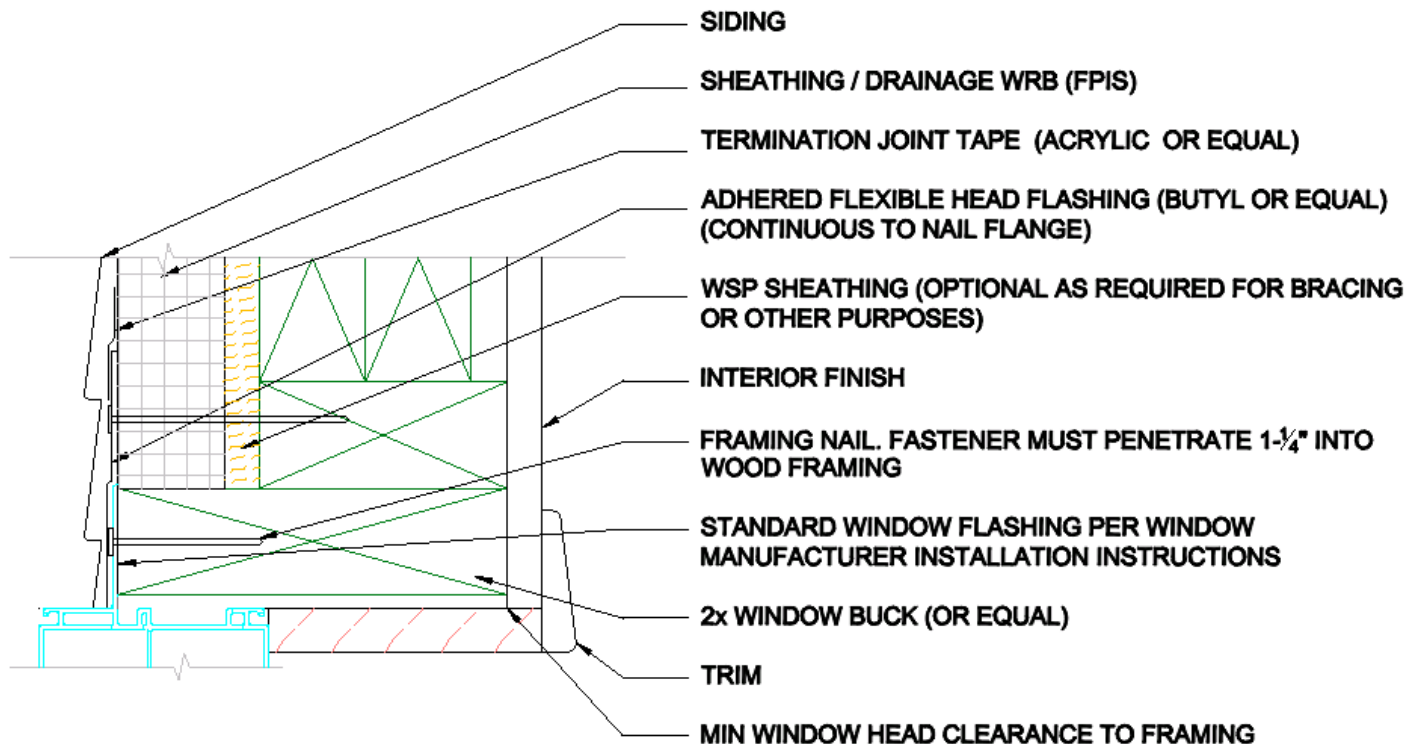


FIGURE 34. WOOD BUCK INSTALLATION – HEADER

6.3.6 Picture Frame Installation

- 6.3.6.1 This concept is with window flanges mounted directly to the picture frame. Represents a common method for installing windows typically used for foam thicknesses of $\frac{3}{4}$ inch to $1\frac{1}{2}$ inches to match common lumber dimensions and using FPIS as the WRB. Use of a separate WRB material is also common and acceptable with appropriate installation and detailing.

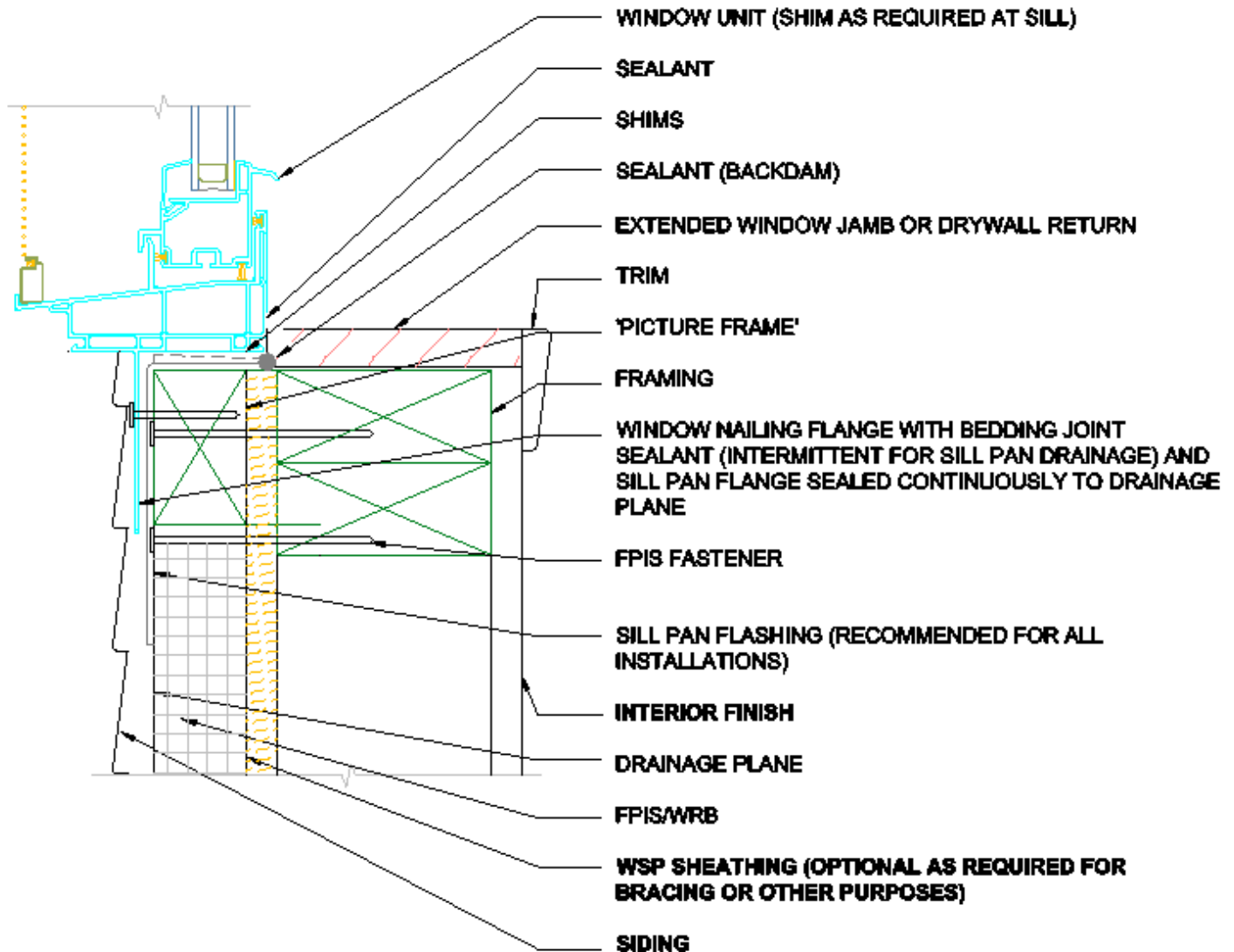


FIGURE 35. PICTURE FRAME INSTALLATION – SILL

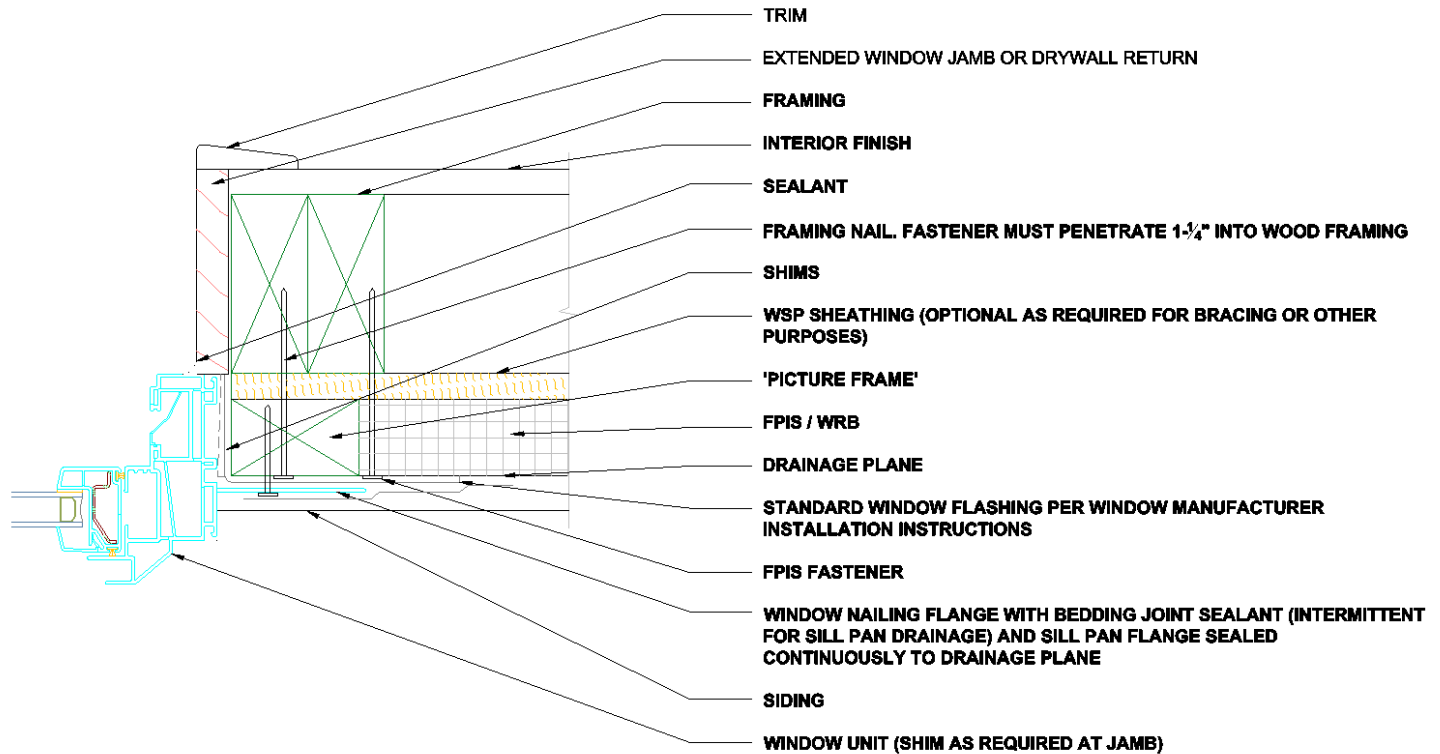


FIGURE 36. PICTURE FRAME INSTALLATION – JAMB

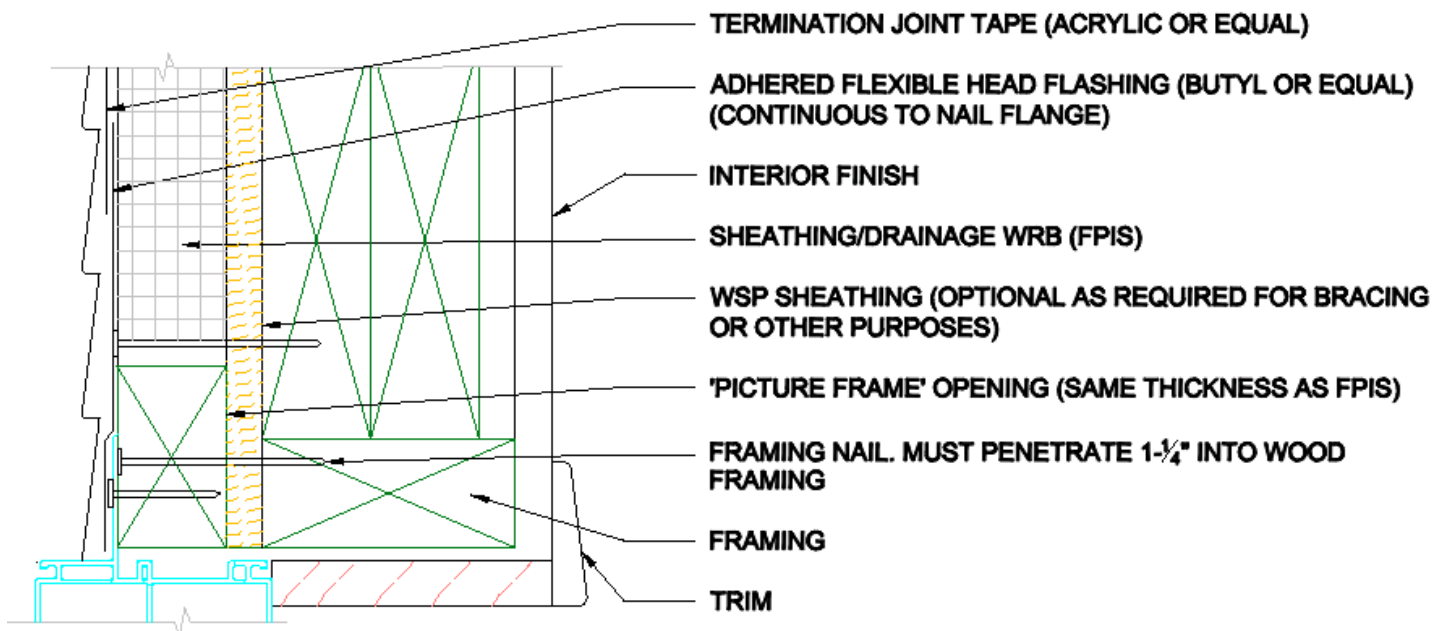


FIGURE 37. PICTURE FRAME INSTALLATION – HEADER

6.3.7 Rainscreen Installation

- 6.3.7.1 This concept is with window flanges and furring mounted directly over any thickness of FPIS. Uses FPIS as the WRB. Use of a separate WRB material is also common and acceptable with appropriate installation and detailing.

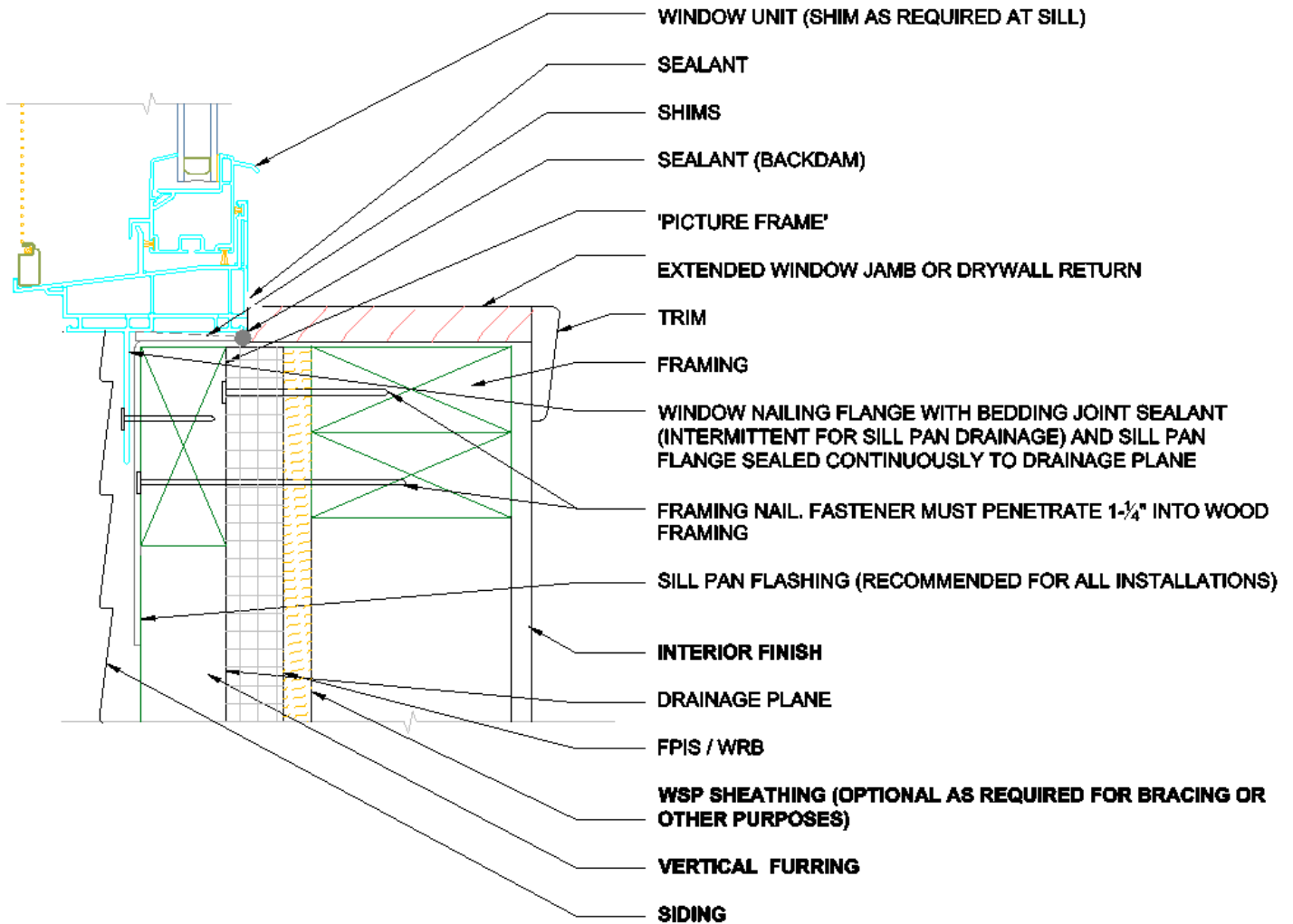


FIGURE 38. RAINSCREEN INSTALLATION – SILL

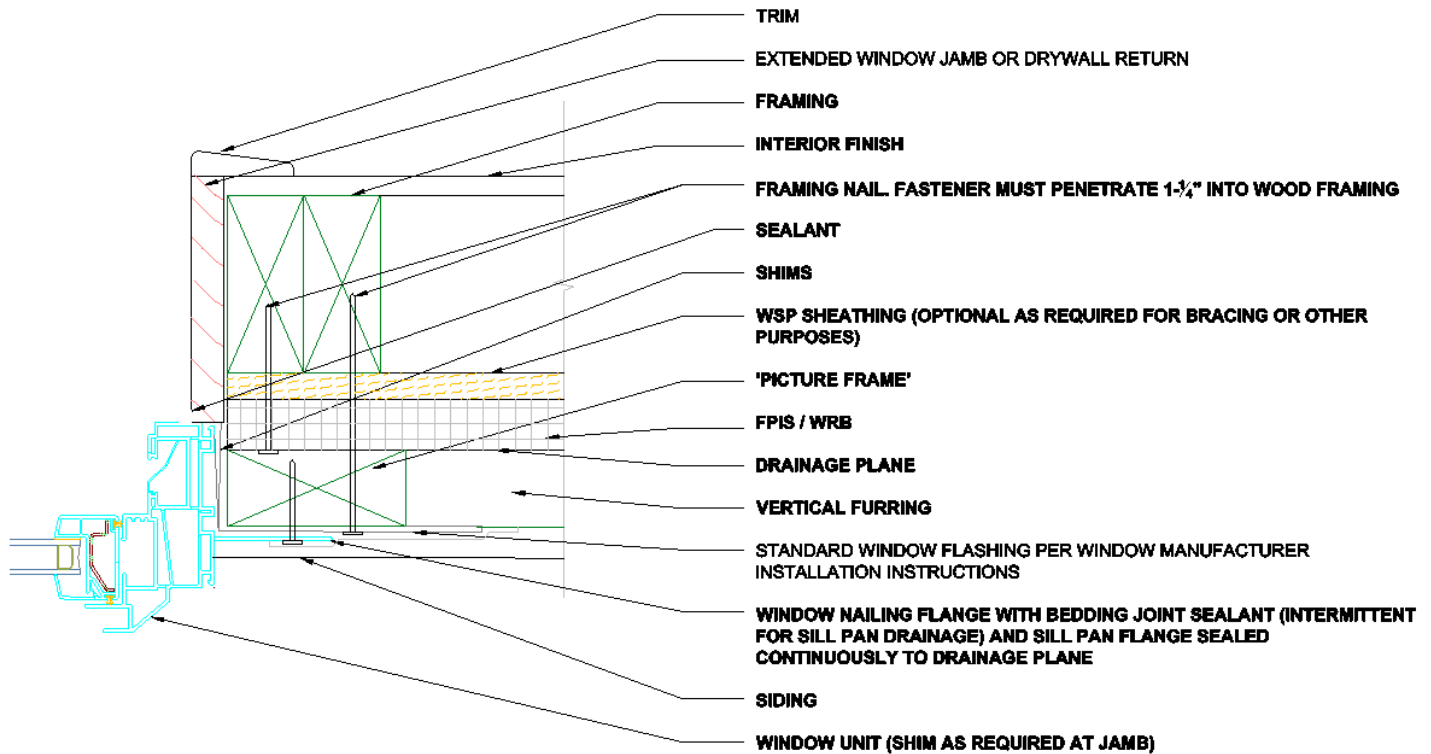


FIGURE 39. RAINSCREEN INSTALLATION – JAMB

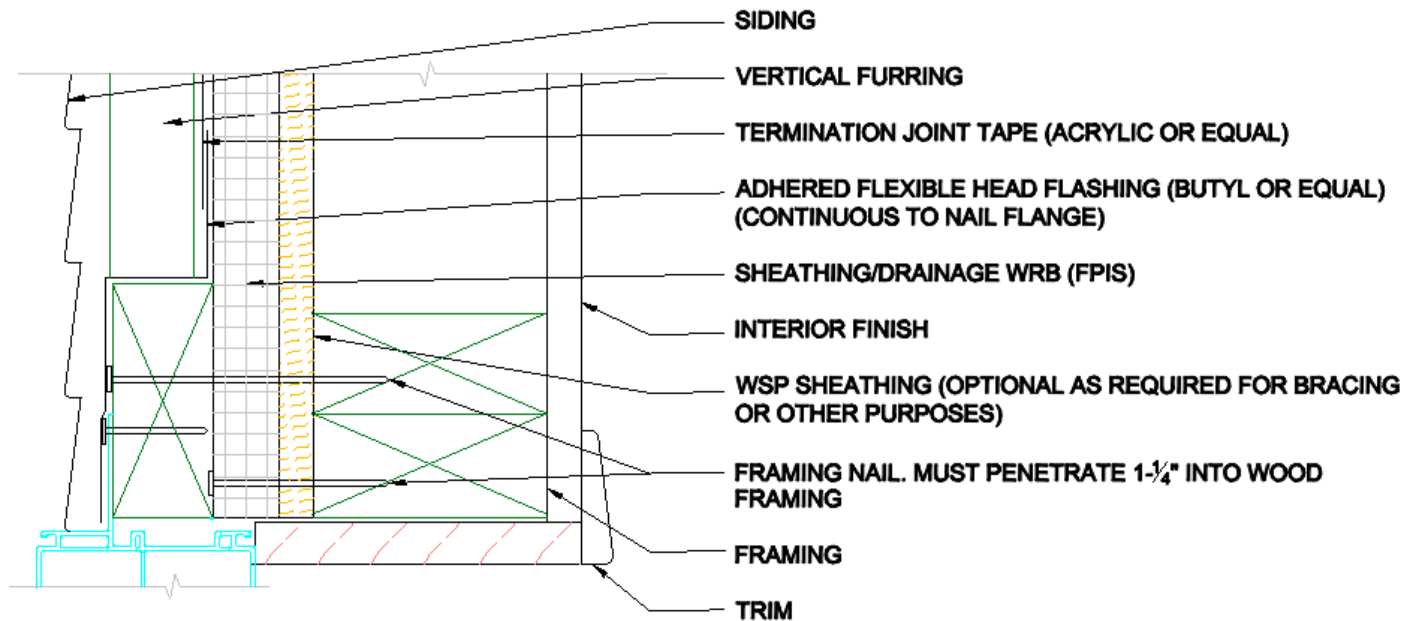


FIGURE 40. RAINSCREEN INSTALLATION – HEADER

6.3.8 Other Penetrations

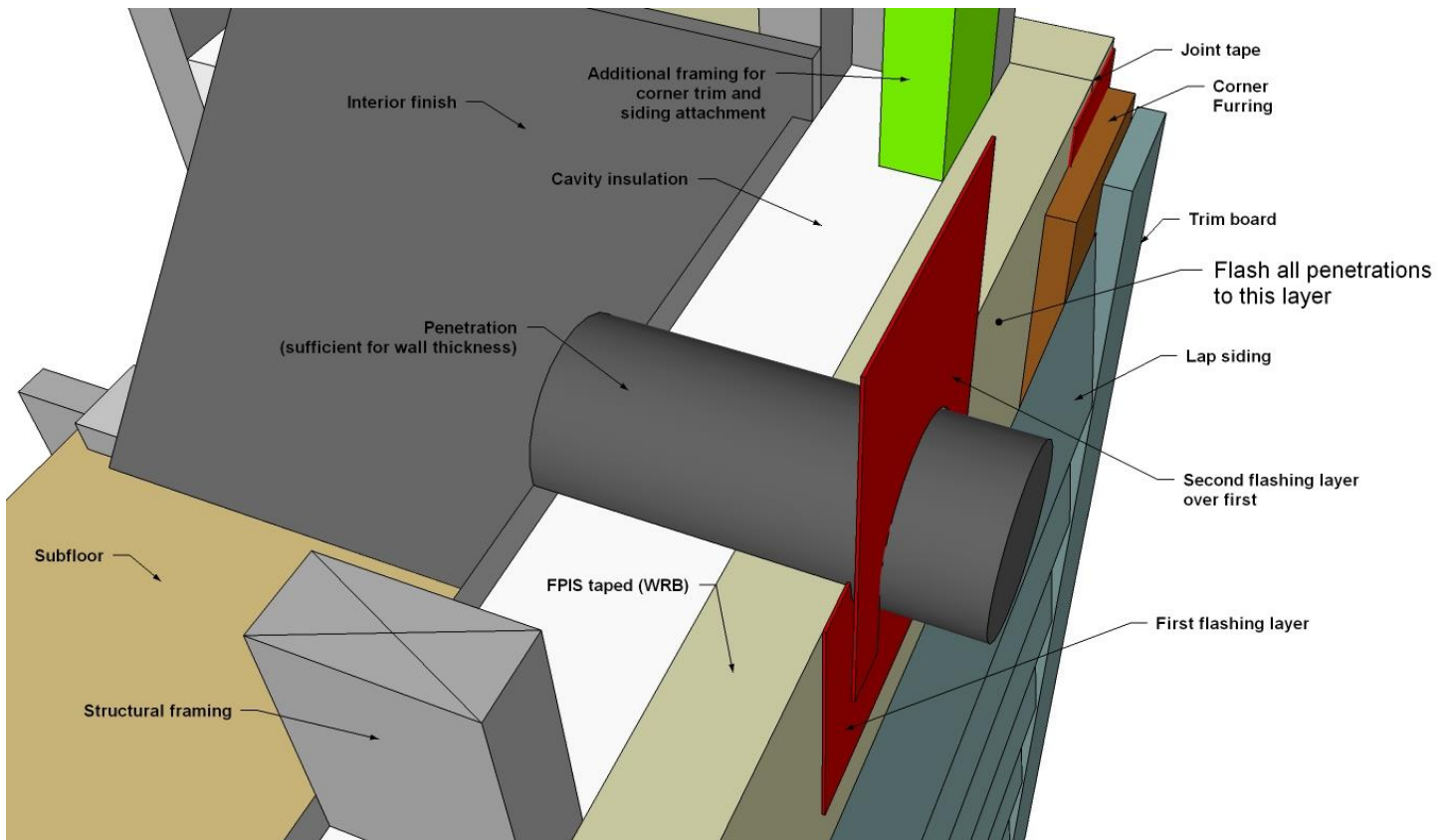


FIGURE 41. PENETRATION – 2" FPIS TAPED JOINTS, FURRING, LAP SIDING

7 SUBSTANTIATING DATA

- 7.1 [ABTGRR 1410-03: Assessment of Water Vapor Control Methods for Modern Insulated Light-Frame Wall Assemblies](#)
- 7.2 [ABTGRR 1501-02: Assessment of Moisture Control & Insulation Requirements in Vermont's Final Draft 2015 Residential Building Energy Standard \(RBES\) and Handbook](#)
- 7.3 [ABTGRR 1504-03: Water-Resistive Barriers: Assuring Consistent Assembly Water-Penetration Resistance](#)
- 7.4 [Attachment of Exterior Wall Coverings through Foam Sheathing](#)
- 7.5 [DRR 1202-01: NFPA 285 Tested Assemblies Using Foam Plastic Insulating Sheathing Products](#)
- 7.6 [DRR 1202-03: Foam Plastic Insulating Sheathing Products in Type V Construction](#)
- 7.7 [DRR 1202-04: Foam Plastic Insulating Sheathing Products in Type I, II, III, or IV Construction](#)
- 7.8 [DRR 1303-04: Attachment of Exterior Wall Coverings through Foam Plastic Insulating Sheathing \(FPIS\) to Wood Wall Framing](#)
- 7.9 [DRR 1304-01: Attachment of Windows with Integral Flanges through Foam Plastic Insulating Sheathing to Wood Framing](#)
- 7.10 [DRR 1410-05: Foam Plastic Insulating Sheathing Products & Accessories Used as a Code Compliant Water-Resistive Barrier \(WRB\) System](#)
- 7.11 [DRR 1410-06: Foam Plastic Insulating Sheathing Used as an Air Barrier Material in an Air Barrier Assembly](#)
- 7.12 [Foam Sheathing used as a Water-Resistive Barrier System](#)
- 7.13 [Window Installation with Foam Sheathing and Wood Framing](#)



- 7.14 Information contained herein is the result of testing and/or data analysis by sources which conform to IBC Section 1703 and relevant professional engineering regulations. DrJ relies on accurate data from these sources to perform engineering analysis.
- 7.15 Where appropriate, DrJ's analysis is based on provisions that have been codified into law through state or local adoption of codes and standards. The providers of the codes and standards are legally responsible for their content. DrJ analysis may use code-adopted provisions as a control sample. A control sample versus a test sample establishes a product as being equivalent to that prescribed in this code in quality, strength, effectiveness, fire resistance, durability, and safety. Where the accuracy of the provisions provided herein is reliant upon the published properties of materials, DrJ relies upon the grade mark, grade stamp, mill certificate, and/or test data provided by material suppliers to be minimum properties. DrJ analysis relies upon these properties to be accurate.
- 7.16 The Foam Sheathing Committee (FSC) of the American Chemistry Council sponsors research and tools to support the reliable, efficient, and economic design and installation of foam sheathing. This report is developed by DrJ from a grant provided by FSC. Learn more about foam sheathing at continuousinsulation.org.

8 FINDINGS

- 8.1 The details shown herein are details for the installation of FPIS in accordance with the applicable codes referenced herein.
- 8.2 This product has been evaluated in the context of the codes listed in Section 2 and is compliant with all known state and local building codes. Where there are known variations in state or local codes applicable to this evaluation, they are listed here.
- 8.2.1 No known variations
- 8.3 Building codes require data from valid research reports be obtained from approved sources (i.e., licensed registered design professionals [RDPs]).
- 8.3.1 Building official approval of a licensed RDP is performed by verifying the RDP and/or their business entity is listed by the licensing board of the relevant jurisdiction.
- 8.4 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10¹⁰ are similar) states:

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code...Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.

9 CONDITIONS OF USE

- 9.1 The details shown in this research report are conceptual in nature and are intended to provide the user with code compliance and best practices for detailing walls using FPIS. Suitability for a specific application is the responsibility of the building designer.
- 9.2 The insulated sheathing products listed in Section 4.1 of this report shall be installed in compliance with the manufacturer's installation instructions, the applicable building code sections, structural requirements, fire requirements, wind pressure requirements, exterior wall covering requirements, flashing requirements, moisture barrier requirements, and this research report.
- 9.3 Use of the details in this research report are subject to the following conditions:
- 9.3.1 Interior finish shall comply with the locally applicable building code and approved construction documents (typically ½" gypsum wall board is used on the interior to comply with thermal barrier requirements for walls with FPIS on the exterior side).
- 9.3.2 Interior vapor retarder class (Class I, I, or III) shall be in accordance with the locally applicable building code and approved construction documents. Refer to additional information in Section 7.6.

¹⁰ 2018 IFC Section 104.9



- 9.3.3 Wood or cold-formed steel framing shall comply with the locally applicable building code and approved construction documents. Where required, framing or blocking shall be provided for attachment of interior and exterior finish materials.
- 9.3.4 Wall bracing method and amount shall comply with the locally applicable building code and approved construction documents; applicable bracing methods include continuous or intermittent structural panel bracing, wood let-in bracing, and metal strap bracing. Where intermittent panel bracing is used, FPIS continuous insulation thickness shall be reduced to maintain a uniform wall thickness as permitted by the locally applicable energy code.
- 9.3.5 Cavity insulation type and amount shall comply with the locally applicable energy code.
- 9.3.6 Continuous insulation type shall comply with this research report (Section 1.1 and Section 4) and shall be installed in accordance with the manufacturer's installation instructions, the locally applicable building code; the amount of continuous insulation shall comply with the locally applicable building code (depending on class of interior vapor retarder used, climate zone, and amount of cavity insulation) and the locally applicable energy code (depending on climate zone). Refer to additional information in Section 7.11.
- 9.3.7 The water-resistive barrier installation and flashing or sealing method at wall penetrations and transitions or discontinuities shall comply with the locally applicable building code, approved construction documents, WRB and flashing manufacturer installation instructions, and window and door component manufacturer installation instructions. The WRB layer may be a separate membrane, FPIS sheathing, or other method approved for use as a water-resistive barrier. Refer to additional information [DRR 1410-05](#).
- 9.3.8 A continuous air-barrier layer shall be provided in accordance with the locally applicable energy code; the air-barrier layer may be designated as the FPIS layer, the interior finish layer, the WRB layer, the structural sheathing layer, or other continuous material layer meeting the requirements for an air barrier. Joints, penetrations and transitions shall be sealed to maintain continuity of the air barrier. Refer to the manufacturer data and installation instructions for approved air-barrier materials, components, and assemblies. Refer to additional information in [DRR 1410-06](#).
- 9.3.9 Window and door installations shall comply with the manufacturer installation instructions; where application over FPIS is not addressed, refer to one or more of the following for guidance: [Continuous Insulation for Residential Windows](#), [Window Installation Instructions for Walls with Continuous Insulation](#), or [Installation and Performance of Flanged Fenestration Units Mounted on Walls with Foam Plastic Insulation Sheathing](#).
- 9.3.10 Cladding installation over foam sheathing shall comply with the locally applicable building code or an approved design, or an approved attachment method complying with the [Cladding Connections resources](#) at continuousinsulation.org. Cladding fasteners shall penetrate into framing members for the required minimum embedment depth. Attachment to an approved sheathing material on when approved by design or specifically permitted by the locally applicable building code. Refer to additional information in Section 7.13.
- 9.3.11 Furring installation over FPIS, where used as a means of cladding installation, shall comply with the locally applicable building code, approved design, or an approved attachment method complying with the [Cladding Connections resources](#) at continuousinsulation.org. Cladding attachment to furring shall comply with the cladding manufacturer's installation instructions and the locally applicable building code.
- 9.3.12 Fire safety requirements for walls with FPIS shall comply with the locally applicable building code and approved construction documents; refer to [DRR 1202-01](#), [DRR 1202-03](#), and [DRR 1202-04](#).
- 9.3.13 It is the user's responsibility to ensure the wall assembly as a whole and all specified materials or components (as generally represented in this research report) are properly integrated as a system that complies with all applicable building code provisions, approved construction documents, manufacturer installation instructions, and good construction practice.
- 9.3.14 It is the user's responsibility to determine appropriate construction sequence and inspection sequence to ensure a quality installation that meets or exceeds the administrative and functional intent of the building code. Items that will be concealed during construction, such as the WRB layer and flashing, should be inspected and functionally verified prior to concealment. A functioning WRB layer and flashing system and other necessary weather-resistive barrier components should be installed to prevent moisture intrusion prior



to installation of wall cavity insulation, vapor retarders and interior finishes. It is the responsibility of the user to ensure materials are dry prior to wall enclosure.

- 9.4 Where required by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed, this DRR and the installation instructions shall be submitted at the time of permit application.
- 9.5 Any generally accepted engineering calculations needed to show compliance with this DRR shall be submitted to the AHJ for review and approval.
- 9.6 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (e.g., owner or RDP).
- 9.7 At a minimum, this product shall be installed per Section 6 of this DRR.
- 9.8 This product is manufactured under a third-party quality control program in accordance with IBC Section 104.4 and Section 110.4 and IRC Section R104.4 and Section R109.2.
- 9.9 The implementation of this DRR for this product is dependent on the design, quality control, third-party quality assurance, proper implementation of installation instructions, inspections required by IBC Section 110.3, and any other code or regulatory requirements that may apply.

10 IDENTIFICATION

- 10.1 Where required by the applicable building code, wall assembly components shall be identified by a label on the board or packaging material bearing the manufacturer's name, product name, label of the third-party inspection agency, and other information to confirm code compliance.
- 10.2 Additional technical information can be found at the respective FSC member websites found at fsc.americanchemistry.com/Members.

11 REVIEW SCHEDULE

- 11.1 For the most recent version or current status of this DRR, visit drjengineering.org or contact DrJ Engineering.